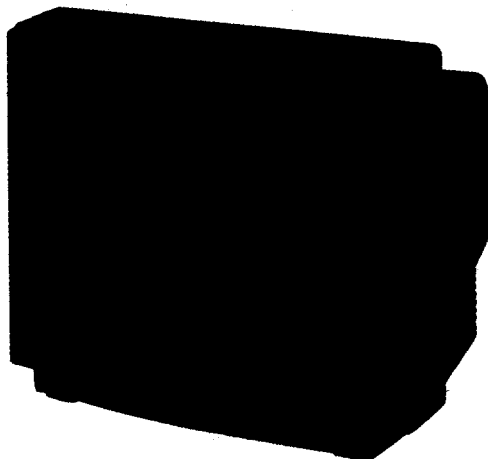


KV-X2130B

RM-688

SERVICE MANUAL

French Model
Chassis No. SCC-D52A-A



AE-1B CHASSIS

Note: The service manual for RM-688 has been issued separately.

MODELS OF THE SAME SERIES

KV-X2130B	
KV-X2530B	

SPECIFICATIONS

Television system B/G/H, I, L

Sound output 15 W + 15 W (music power)

Color system PAL, SECAM, NTSC3.58, NTSC4.43

Power consumption 90 Wh

Channel coverage B, G, H: VHF E2-E12, UHF E21-E69
CABLE S1-S41

Dimensions Approx. 513x438x474 mm (w/h/d)

L: VHF 2-10, UHF 21-69
CABLE B-Q

Weight Approx. 25.5 kg

I: VHF A-J, UHF 21-69

Picture tube Trinitron tube
Approx. 54.5 cm (21 inches)
(Approx. 51 cm picture measured diagonally
110-degree deflection)

Supplied accessories RM-688 Remote Commander (1)
IEC designation R6 batteries (2)

Inputs

- Ⓐ 1 21-pin connector :
CENELEC standard including RGB input.
- Ⓑ 2 21-pin connector :
including S video input
- Ⓒ 3 Video, Audio : phono jack.

Design and specifications are subject to change without notice.

Outputs

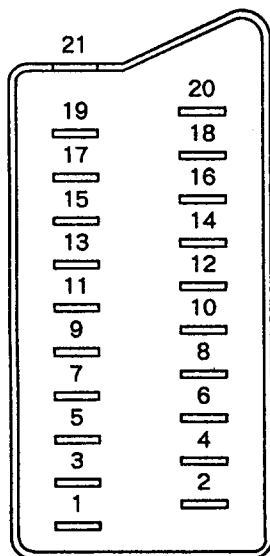
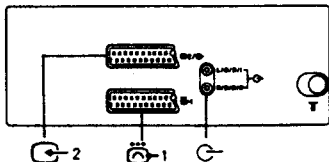
- 21-pin connector : CENELEC standard
- Headphones jack : stereo minijack
- External speaker terminals : 2-pin DIN
- Audio output jacks : phono jack (output dependent upon TV settings)



TRINITRON® COLOUR TV

SONY®

21 pin connector (①-1, ②-2)



Pin No	1	2	Signal	Signal level
1	○	○	Audio output B (right)	Standard level : 0.5Vrms Output impedance : Less than 1kohm*
2	○	○	Audio input B (right)	Standard level : 0.5Vrms Input impedance : More than 10kohms*
3	○	○	Audio output A (left)	Standard level : 0.5Vrms Output impedance : Less than 1kohm*
4	○	○	Ground (audio)	
5	○	○	Ground (blue)	
6	○	○	Audio input A (left)	Standard level : 0.5Vrms Input impedance : More than 10kohms*
7	○	●	Blue input	0.7V±3dB, 75ohms, positive
8	○	○	Function select (AV control)	High state (9.5-12 V) : Part mode Low state (0-2 V) : TV mode Input impedance : More than 10kohms Input capacitance : Less than 2 nF
9	○	○	Ground (green)	
10	○	○	Open	
11	○	●	Green	Green signal : 0.7V±3dB, 75ohms, positive
12	○	○	Open	
13	○	○	Ground (red)	
14	○	○	Ground (blanking)	
15	○	-	Red input	0.7V±3dB, 75ohms, positive
	-	○	(S signal) chroma input	0.3V±3dB, 75ohms, positive
16	○	●	Blanking input (Ys signal)	High state (1-3 V) Low state (0-0.4 V) Input impedance : 75ohms
17	○	○	Ground (video output)	
18	○	○	Ground (video input)	
19	○	○	Video output	1V±3dB, 75ohms, positive Sync : 0.3V (-3, +10dB)
20	○	-	Video input	1 V±3dB, 75ohms, positive Sync : 0.3V (-3, +10dB)
	-	○	Video input/Y (S signal)	1 V±3dB, 75ohms, positive Sync : 0.3V (-3, +10dB)
21	○	○	Common ground (plug, shield)	

○ connected


● unconnected (open)

* at 20 Hz-20 kHz

WARNING !!

AN ISOLATION TRANSFORMER SHOULD BE USED DURING ANY SERVICE TO AVOID POSSIBLE SHOCK HAZARD, BECAUSE OF LIVE CHASSIS. THE CHASSIS OF THIS RECEIVER IS DIRECTLY CONNECTED TO THE AC POWER LINE.

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND MARK  ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION!!

AFIN D'ÉVITER TOUT RISQUE D'ÉLECTROCUTION PROVENANT D'UN CHÂSSIS SOUS TENSION, UN TRANSFORMATEUR D'ISOLEMENT DOIT ÊTRE UTILISÉ LORS DE TOUT DÉPANNAGE. LE CHÂSSIS DE CE RÉCÉPTEUR EST DIRECTEMENT RACCORDÉ À L'ALIMENTATION SECTEUR.

ATTENTION AUX COMPOSANTS RELATIFS À LA SÉCURITÉ!!


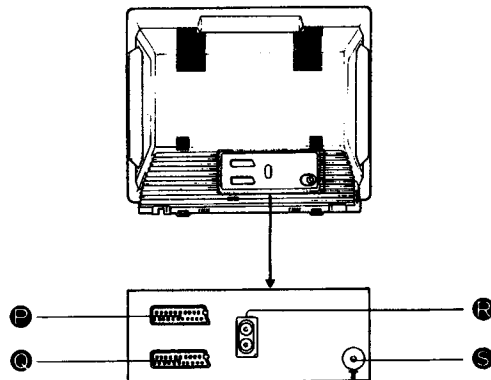
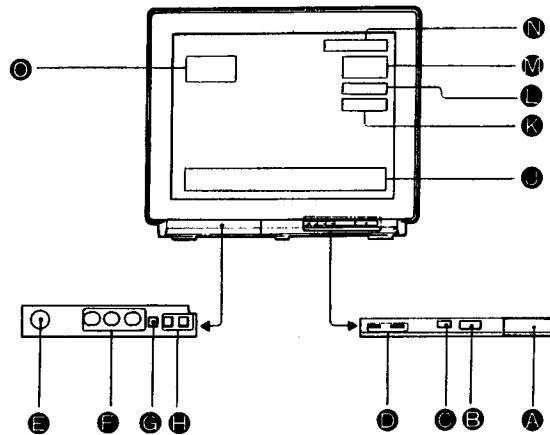
LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET PAR UNE MARQUE  SUR LES SCHÉMAS DE PRINCIPE, LES VUES EXPLOSÉES ET LES LISTES DE PIÈCES SONT D'UNE IMPORTANCE CRITIQUE POUR LA SÉCURITÉ DU FONCTIONNEMENT. NE LES REMPLACER QUE PAR DES COMPOSANTS SONY DONT LE NUMÉRO DE PIÈCE EST INDIQUÉ DANS LE PRÉSENT MANUEL OU DANS DES SUPPLÉMENTS PUBLIÉS PAR SONY.

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1. GENERAL		
1-1.	Function of Controls.....	4
1-2.	To Preset Channels.....	6
1-3.	Operating Other Equipment.....	7
1-4.	Connecting Other Equipment.....	7
1-5.	Receivable Channels and Channel Display.....	8
2. DISASSEMBLY		
2-1.	Rear Cover Removal.....	9
2-2.	Chassis Assmby Removal.....	9
2-3.	A and J1 Boards Removal.....	9
2-4.	B and V Boards Removal.....	10
2-5.	Service Position.....	10
2-6.	Picture Tube Removal.....	11
3. SET-UP ADJUSTMENTS		
3-1.	Beam Landing.....	12
3-2.	Convergence.....	13
3-3.	Focus.....	14
3-4.	White Balance.....	15
4. CIRCUIT ADJUSTMENTS		
4-1.	A Board Adjustment.....	16
4-2.	B Board Adjustments.....	16
4-3.	D Board Adjustments.....	17
4-4.	J1 Board Adjustments.....	17
4-5.	Secondary Adjustment.....	18
5. DIAGRAMS		
5-1.	Block Diagram.....	19
5-2.	Circuit Boards Location.....	25
5-3.	Schematic Diagrams and Printed Wiring Boards.....	26
5-4.	Semiconductors.....	49
6. EXPLODED VIEWS		
6-1.	Chassis.....	50
6-2.	Picture Tube.....	51
7. ELECTRICAL PARTS LIST		52

SECTION 1 GENERAL

1-1. FUNCTION OF CONTROLS



ON THE SET

A Power Switch

Use it to switch the set on and off. When you switch the set on, the programme number of the station tuned in will be indicated in the on-screen display (M) for some seconds. In case of short breaks of operation, you can switch the set on and off using the Remote Commander (See «CONTROLS ON THE REMOTE COMMANDER»).

B Remote control detector

(See «CONTROLS ON THE REMOTE COMMANDER»).

C Standby/Response indicator

This indicator lights up when the TV set is in standby mode and it flashes each time the set receives signals from the Remote Commander.

D Stereo A/B indicators

During bilingual programmes one of the two indicators lights up, depending upon the selected channel A or B. When stereo programmes are broadcast both indicators light up. (See «CONTROLS ON THE REMOTE COMMANDER»).

Jacks and control panel (front of set)

The jacks and the control panel are situated behind a cover. Please press the arrow marking on the cover to open it.

E Headphones jack (stereo minijack)

Connect only stereo headphones.

F G Input jacks

Video input jack (phono jack) G-3 (yellow)

Audio input jacks (phono jacks) G- (red and white).

G Mode select button

Use this button to select either the channel select mode, volume adjustment Δ or the G- input mode.

H Adjustment buttons +/-

Select at first the item to be adjusted using the Mode select button (P: channel select mode), Δ (volume) or G- (input mode), then adjust the item by pressing the + or - button.

You can also use these buttons to reset the picture and sound adjustments to the factory-set levels. For this purpose press both buttons simultaneously.

On-screen display

When you repeatedly press button \square on the Remote Commander, the following information will be indicated on the screen in turn:

I Picture and sound adjustment items:

I contrast, J colour, K brightness, L bass, M treble or N balance and their respective levels; as well as O mute, P reset, Q space sound, R loudness and NICAM indications, when the respective buttons are pressed.

When you press button \square on the Remote Commander, the following information will be indicated on the screen:

K TV-System: I (normal UK broadcast system)

L Channel number

M Programme number or input mode;

G-1, G-, G-2, G-2, G-3;

N Indication of the station name

O AV output indication; 1 G-, 2 G-, 3 G- or TV G- (see «CONTROLS ON THE REMOTE COMMANDER»).

Connectors on the rear

P Euro-AV-connector 21-pin G-2/E-2

For connecting a VTR, 8 mm video camera recorder, a video disc player or in general devices with an S-Video-output.

Q Euro-AV-connector 21-pin G-1

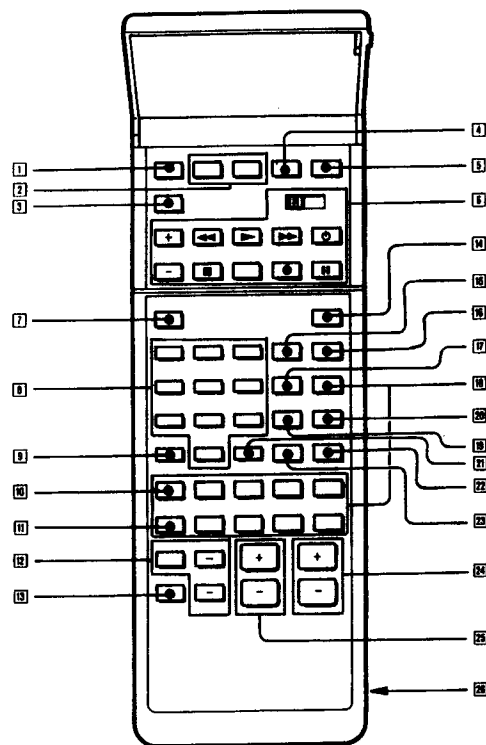
For connecting a VTR, a computer etc. with RGB output.

R Audio-output-jacks (phono jacks) G-

For connecting audio equipment, e.g. an amplifier, so that the sound will be output at the audio equipment. In this case the volume is adjustable on the TV set.

S Aerial terminal T

ON THE REMOTE COMMANDER



On the set there is a Remote Control detector (15), which receives the signals of the Remote Commander.

- 1 ➡ **Preset-button** Used for selecting the Preset mode. See »TO PRESET CHANNELS«.
- 2 ⏮ **Tuning +/- buttons**
 - a) Preset mode: Used for tuning in stations in the Automatic Station Search: See »TO PRESET CHANNELS«.
 - b) TV-mode: Used for fine-tuning a station. See »ADDITIONAL FUNCTIONS«.
- 3 C- button (Clear) Used for clearing programme positions, so that the position will be skipped when the PROGR +/- buttons (24) are pressed. See »TO PRESET CHANNELS«.

- 4 ◇ **Store button:** Used for storing channels. See »TO PRESET CHANNELS«.
- 5 Ⓢ **TV-system-select-button**
This button has no function;
- 6 **Video selector and video operation buttons**
Used for operating Sony video equipment. For details see »CONNECTING OTHER EQUIPMENT«.
- 7 ⏸ **Mute button**
By pressing this button the sound of the set will be switched off and by pressing it once more the sound will be restored.
- 8 **Number buttons**
 - a) Used to select programme positions or to input channel numbers (in the preset mode).
 - b) If the set is in the standby mode, press one of the number buttons to switch it on.
 - c) After pressing the Output select button (17) the buttons 1-3 can be used to select the different Output connectors.
- 9 +/- **Button**
In case of two digit numbers, press first this button and then the two respective number buttons (8).
- 10 Ⓢ **Button for On-screen display**
By pressing this button information about the station tuned-in will be indicated on the screen. The indications will disappear after some seconds with the exception of the programme number, which will stay on the screen until the button is pressed once again.
- 11 ⌚ **Time button** Ⓢ
In TV-mode: If teletext service is broadcast on the selected channel, press this button to display the current time on the screen and once again to make it disappear.
- 12 +/- **Buttons for picture and sound adjustments**
 - a) **TV-mode:**
The picture and sound adjustments are stored as standard values. You have, however, the possibility to change them to your individual liking. Press the button repeatedly until the required item is indicated in the on-screen display: Ⓢ contrast, Ⓢ colour, Ⓢ brightness, Ⓢ hue (only for NTSC colour system), Ⓢ sharpness, Ⓢ bass, Ⓢ treble or Ⓢ balance. You can adjust the settings by pressing the + or - button.
 - b) **Preset-mode:** Use these buttons to name a station. See »TO PRESET CHANNELS«.
- 13 ⏮ **Reset-button**
By pressing this button the picture and sound adjustments are reset to the factory-set levels.
- 14 Ⓢ **Standby-button**
Press this button to switch the set into standby-mode. You can switch it on again by pressing the TV-button (16) or one of the number buttons (8). To return to the teletext mode, press the Ⓢ/Ⓢ button. There will be a slight delay before the picture is restored.

Note

Use the Standby-button (14) only when switching the set off for a short period of time. If the set will not be used for a longer span of time, switch it off by using the Power switch (A).

- 15 Ⓢ **Input-Select-Button**
Press this button to select the audio- or video-signals input at the various input connectors. With each pressing of the button a different connector is selected. The following indications will appear sequentially:
Ⓢ 1 → Ⓢ (RGB) → Ⓢ 2 → Ⓢ 2 → Ⓢ 3 → Ⓢ 3
Ⓢ TV-mode
- 16 Ⓢ **TV-Button**
When pressing this button the set returns from standby, video input- or teletext mode to the TV-mode.
- 17 Ⓢ **Output-Select-Button**
Press this button to select the audio- or video signals to be output at the Ⓢ/Ⓢ connector. First press this button, then select the desired signal source using the number buttons (8) (either 1, 2 or 3) or the TV-button (16) (if the signals which are on the screen are to be output).
- 18 **Teletext operation buttons**
These buttons are used for teletext operation. See »VIEWING TELETEXT«.
- 19 Ⓢ **Loudness button**
By pressing this button the high and low tones will be emphasized. Press the button again to restore the normal sound. The indications on the screen will be Ⓢ or Ⓢ.
- 20 A/B **button**
To select the channel of bilingual programmes. Usually the synchronized version is broadcast on channel A and the original sound is broadcast on channel B. In the video input mode (Euro-AV-connectors) this possibility of selecting channels also exists.
- 21 C (Channel select) **button**
Use this button for direct channel tuning in the TV-mode. See »ADDITIONAL FUNCTIONS«.
- 22 **Noise reduction button**
Press to reduce the noise on the picture. The Noise reduction indicator (19) lights up. Press the button again to restore the normal picture.
- 23 Ⓢ **Space sound button**
Press this button to obtain special acoustic effects. Press it again to restore the normal sound. The indications on the screen will be Ⓢ or Ⓢ.
- 24 **PROGR +/- buttons**
TV-mode: Use these buttons to scan the available programmes up- or downwards.
Preset mode: Use these buttons to scan the available channels up or downwards.
- 25 +/- **buttons for adjusting the volume**
- 26 **Battery compartment (on the rear)**

1-2. TO PRESET CHANNELS

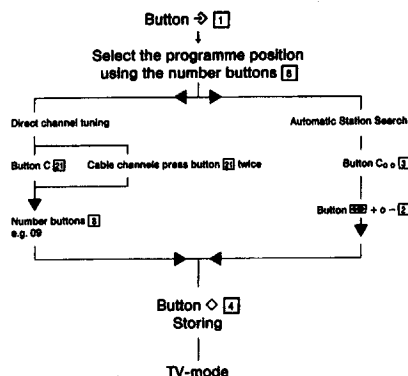
Use the buttons on the Remote Commander for presetting. In total there are 60 programme positions at your disposal for storing channels. There are two different ways of tuning in channels:

1. Direct Channel Tuning

You know the channel number of a station and can input it directly.

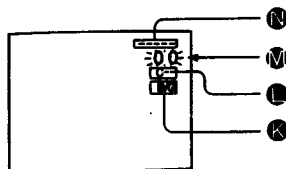
2. Automatic Station Search

The set searches automatically for stations (including cable channels).

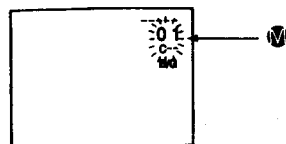


1. Direct Channel Tuning

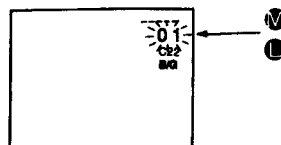
1. Press the Preset button \Rightarrow [1]. You are now in the preset mode of the set. The programme number in the on-screen display starts blinking.



2. With the buttons PROG \pm [2] or the number buttons [0-9] you can select the programme position. In case of two-digit numbers, press first the button \pm [0] and then the two number buttons.

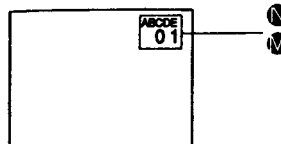


3. Press button C [2]. The indication «C» and the channel number start blinking in the display. Select the channel number with two digits (e.g. 22) using the number buttons [0-9].



If you want to select a cable channel press button C [2] twice. In this case the indication «S» will appear in the display. Select the channel number as described above.

4. Press the button \diamond [4] in order to store the channel and to return to the TV-mode.



If you want to store further channels, repeat the steps 1 to 4.

2. Automatic Station Search

1. Press button \Rightarrow [1]. You are now in the preset mode of the set. The programme number in the on-screen display starts blinking.

2. With the PROG buttons \pm [2] or the number buttons [0-9] you can select the programme position. In case of two-digit numbers, press the first button \pm [0] and then the two number buttons.

3. If there is already a stored station on the selected programme position, press button C [2].

4. Press one of the tuning buttons \pm [2] to start the station search. The search will be interrupted as soon as a station is tuned in. Press the tuning buttons repeatedly until you find the desired station.

5. If you have found the desired station, press button \diamond [4]. Now the selected station is stored and you are back in the TV-mode.

6. If you want to store further stations, repeat the steps 1-5.

Skipping of unused programme positions

Using button C [2] you have the possibility to have unused programme positions (e.g. without a stored station) skipped, when pressing the buttons PROG \pm [2] on the Remote Commander.

1. Press button \Rightarrow [1]. You are now in the preset mode of the set.

2. Use the buttons PROG \pm [2] to select the programme position, which you want to have skipped.

3. Press button C [2].

4. Press button \diamond [4] to store the cleared programme position and to return to the TV-mode.

The skipped programme positions still appear when you press the number buttons [0-9] on the Remote commander.

If you want to name a station

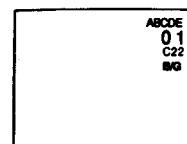
After presetting the stations you have the possibility to name them. The selected name will appear in the on-screen display.

1. Press the preset button \Rightarrow [1].

2. Press the button \boxminus [2]. The first column of the station name starts blinking. Press either button + or - [2] and select the desired character (number or letter, 0-9, A-Z, or - for a blank column).

3. Press button \boxminus [2] again. Now the second column starts blinking and you can select the second character. In this way five characters can be selected.

4. Press button \diamond [4] to store the station name.



Notes

- If you press the preset button \Rightarrow [1] instead of button \diamond [4] the set will return to the TV-mode without storing the channels.
- If you press a wrong programme or a channel number, an «x» will be displayed on the screen.
- When pressing two number buttons, the second number button should be pressed within 5 seconds after the first one, otherwise the operation will be cancelled.

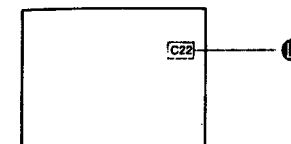
ADDITIONAL FUNCTIONS

Direct Channel Tuning in the TV-mode

You have the possibility to tune in channels directly when the set is in the TV-mode without storing these channels. Example: You tune in channel number 22. If you switch the set off or change the programme position, this channel will be cancelled.

1. Press the button C [2]. In the display the indication «C» will appear. For cable channels press the button C [2] twice. On the screen «S» will be displayed.

2. Select the channel number with two digits using the number buttons [0-9] (e.g. for channel 4 press first 0, then 4). The indication on the screen will disappear within some seconds.



Manual Fine Tuning

If the reception of a channel is not satisfactory, you have the possibility to deactivate the Automatic Fine Tuning, which is usually in operation during presetting in order to tune in the best possible picture.

Press one of the tuning buttons \pm [2] to fine-tune a channel. The Automatic Fine Tuning will be restored when the respective programme position is pressed once again.

1.3. OPERATING OTHER EQUIPMENT

To view the input picture

Press the **↔** button repeatedly until the desired input signal indication appears on the screen.

↔ 1: to view the audio and video signal input through the **↔ 1** connector on the rear.

↔ 1: to view the RGB signal (i.e. from a computer, etc.) input through the **↔ 1** connector.

↔ 2: to view the audio and video signal input through the **↔ 2/↔** connector on the rear.

↔ 2: to view the S video signal (from a VTR equipped with an S video output) input through the **↔ 2/↔** connector.

↔ 3: to view the audio and video signal input through the **↔ 3** connectors and the audio input jacks **↔** (yellow, white and red) on the front.

↔ 3: to view the S video signal input through the **↔ 3** connectors on the front (4-pin connector and white and red phone jacks).

You can also select the desired input mode using the buttons on the front of the set. Select the **↔** mode with the mode select (**P** → **↔** → **↔**) button **↔** then press **+/-** button.

To return to the TV mode, press the TV-button.

To select the signal to be output from the **↔ 2/↔** connector

Press the **↔** button **↔** repeatedly until the desired output source is indicated on the screen:

1 ↔: The audio and video signal input through the **↔ 1** connectors is output from the **↔ 2/↔** connector.

2 ↔: The audio and video signal input through the **↔ 2/↔** connector is output from the **↔ 2/↔** connector.

3 ↔: The audio and video signal input through the **↔ 3** connectors is output from the **↔ 2/↔** connector.

TV ↔: The audio and video signal input through the **T** aerial terminal (i.e. usually the TV signal) is output from the **↔ 2/↔** connector.

The indication will disappear after a few seconds.

Note

The TV-signal is always output at the EURO-AV connector **↔ 1**.

To operate Sony video equipment

The video operation buttons **↔** on the Remote Commander can operate certain VTRs and video disc players manufactured by Sony.

1. Switch the video selector to the desired position.

VIDEO 1: to operate Sony Betamax VTR and SLV 202 VHS.

VIDEO 2: to operate Sony 8 mm VTR.

VIDEO 3: to operate Sony VHS VTR.

MDP: to operate Sony video disc player including a multi disc player.

2. Press the operation button(s) to start operation.

PROGR +/-: to select the desired programme on the VTR.

▶: to start playback, or to release the pause mode

■: to stop the tape or the disc

◀◀: to rewind the tape from stop mode or to rapidly go back to the desired position on the disc or tape from playback mode

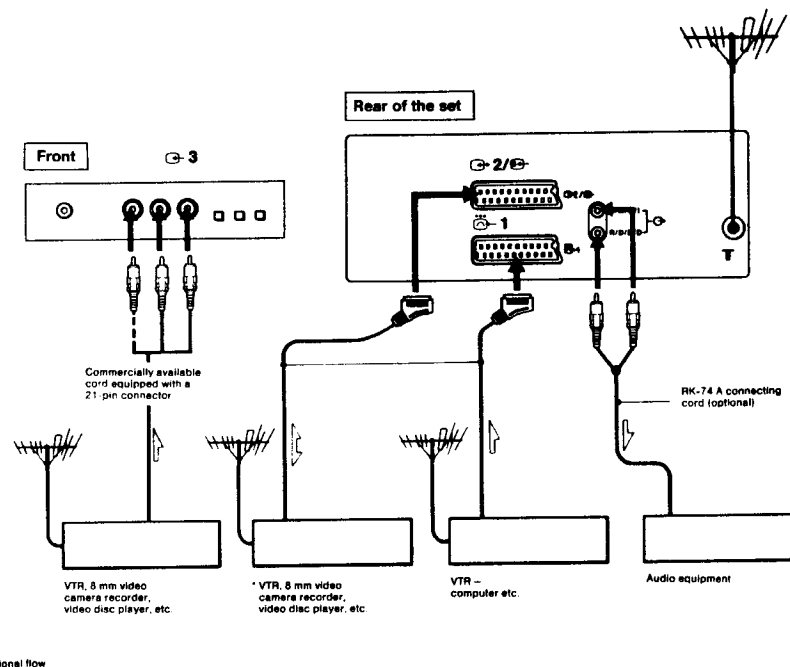
▶▶: to fast forward wind from stop mode or rapidly advance the tape or disc to the desired position from playback mode

●: to start recording on the VTR
Be sure to press this button and the one on the right simultaneously

○: to switch the video equipment on and off

■ ■: to stop the tape or the disc temporarily (pause)
Press again to release pause mode

1.4. CONNECTING OTHER EQUIPMENT



* Connect the S video output of the VTR, etc. here.

Notes

- It is also possible to connect a VTR using the **T** terminal. In this case, connect the aerial to the aerial terminal of the VTR.
- Move the VTR away from the TV if the picture or the sound is distorted.
- Computers which have RGB output only can be connected to the **↔ 1** input connector.

S video input (Y/C input) ↔

Video signals may be separated into Y (luminance or brightness) and C (chrominance) signals.

Usually these two signals are combined in a VTR and output as one signal, and supplied to a TV. Separation of the Y and C signals prevent them from interfering with one another, thereby improving picture quality (especially in luminance). This set is equipped with a S video input through which these separated signals can be input directly. Connect the S video output jack on the VTR to the S video input on this set.

1.5. RECEIVABLE CHANNELS AND CHANNEL DISPLAY

PAL B/G	
Receivable channels	Channel displays
E 2	C 02
3	C 03
4	C 04
⋮	⋮
12	C 12
21	C 21
⋮	⋮
69	C 69

CABLE TV (1)	
Receivable channels	Channel displays
S 1	S 01
2	S 02
⋮	⋮
41	S 41

FRENCH SECAM-L	
Receivable channels	Channel displays
2	C 02
3	C 03
⋮	⋮
10	C 10
21	C 21
⋮	⋮
69	C 69

PAL-I IRELAND	
Receivable channels	Channel displays
A	C 01
B	C 02
C	C 03
D	C 04
E	C 05
F	C 06
G	C 07
H	C 08
J	C 09

ITALY	
Receivable channels	Channel displays
A	C 13
B	C 14
C	C 15
D	C 16
E	C 17
F	C 18
G	C 19
H	C 20
H ₁	C 11
H ₂	C 12

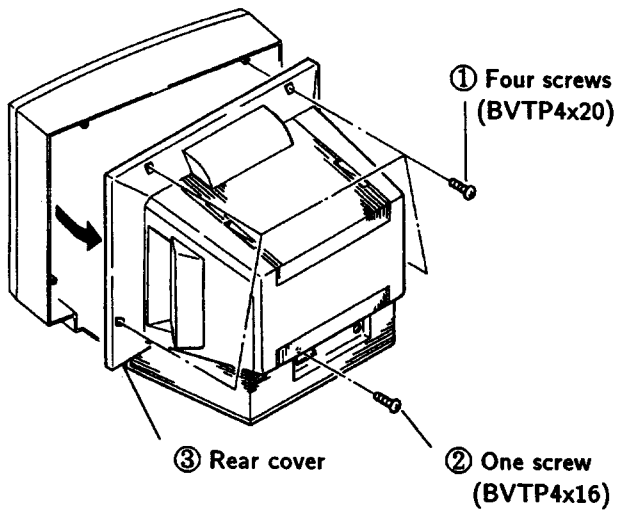
CABLE TV (2)	
Receivable channels	Channel displays
S 01	S 42
⋮	⋮
S 05	S 46
M 1	S 01
⋮	⋮
M 10	S 10
U 1	S 11
⋮	⋮
U 10	S 20

FRENCH CABLE TV	
Receivable channels	Channel displays
B	S 02
C	S 03
D	S 04
⋮	⋮
O	S 15
P	S 16
Q	S 17

PAL-I UK	
Receivable channels	Channel displays
21	C 21
⋮	⋮
69	C 69

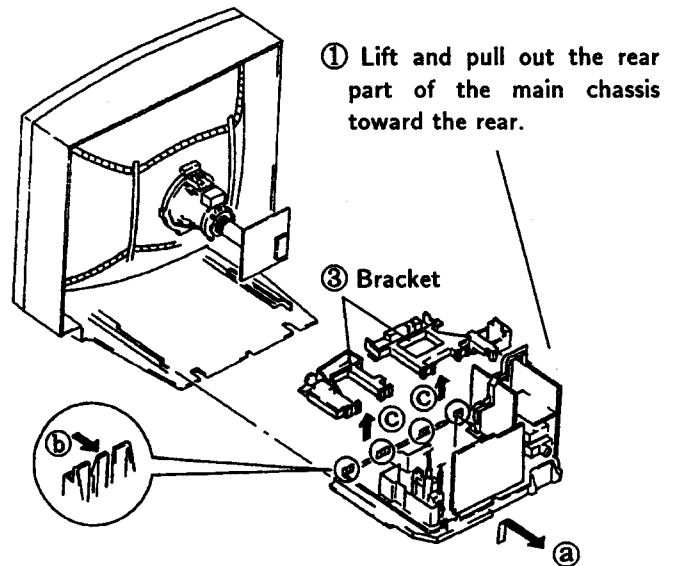
SECTION 2 DISASSEMBLY

2-1. REAR COVER REMOVAL



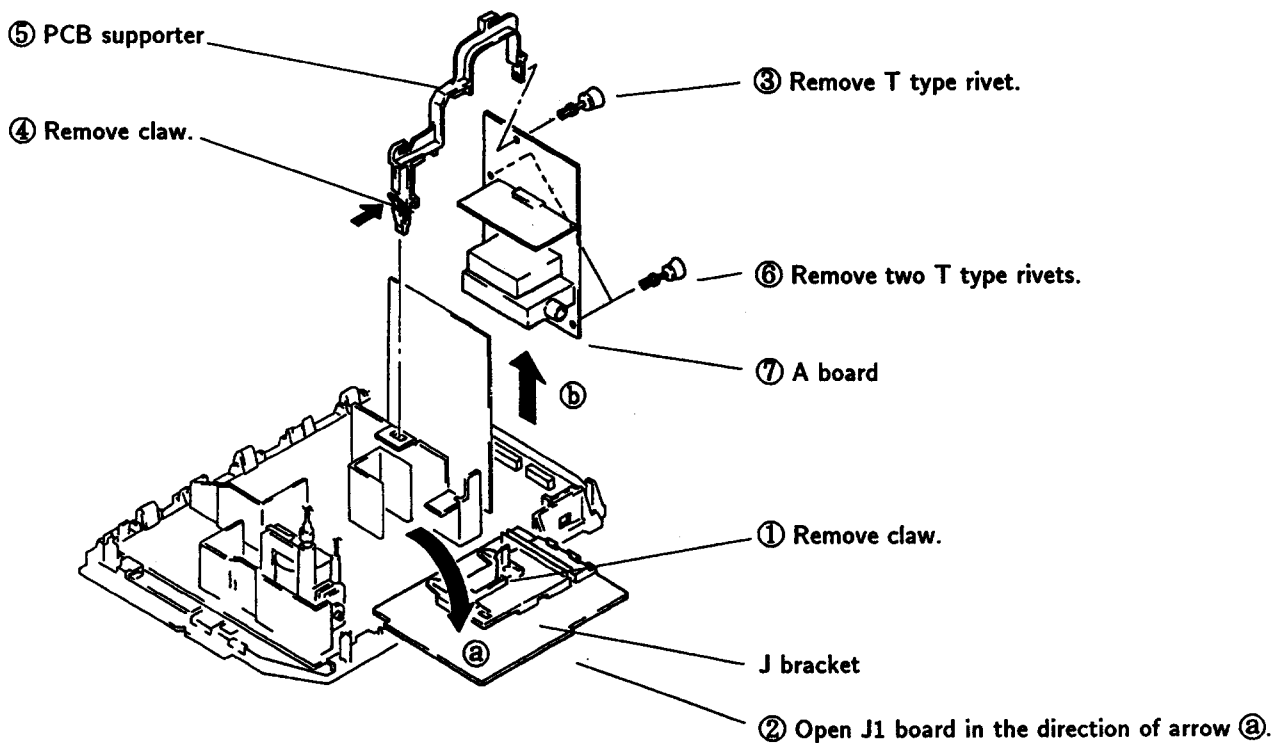
- ① Pull the rear cover and turn the right the speaker leads a fixed by the pathlock on the chassis.
- ② When attaching the rear cover for the speaker leads by pathlock.

2-2. CHASSIS ASSEMBLY REMOVAL

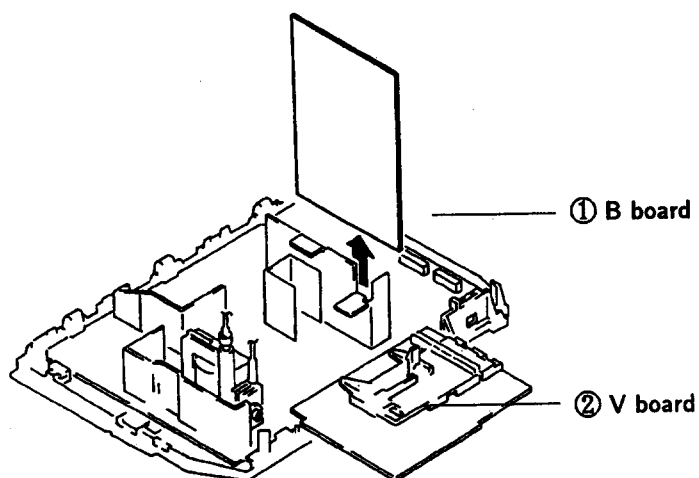


- ② Push four claws of the main chassis in the direction of arrow and remove the bracket.

2-3. A AND J1 BOARD REMOVAL

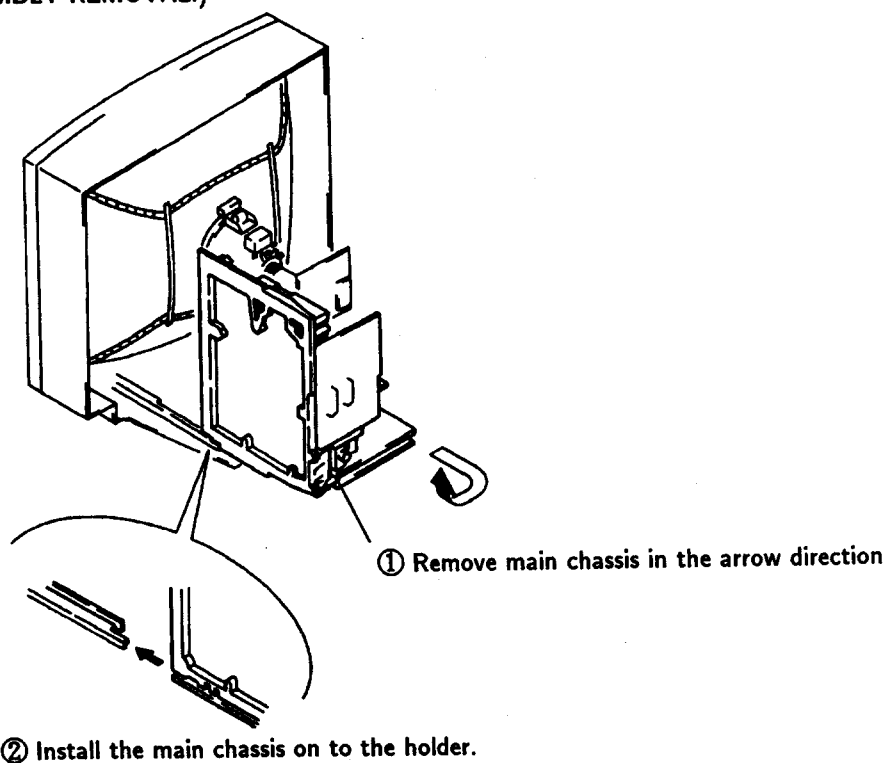


2-4. B AND V BOARDS REMOVAL

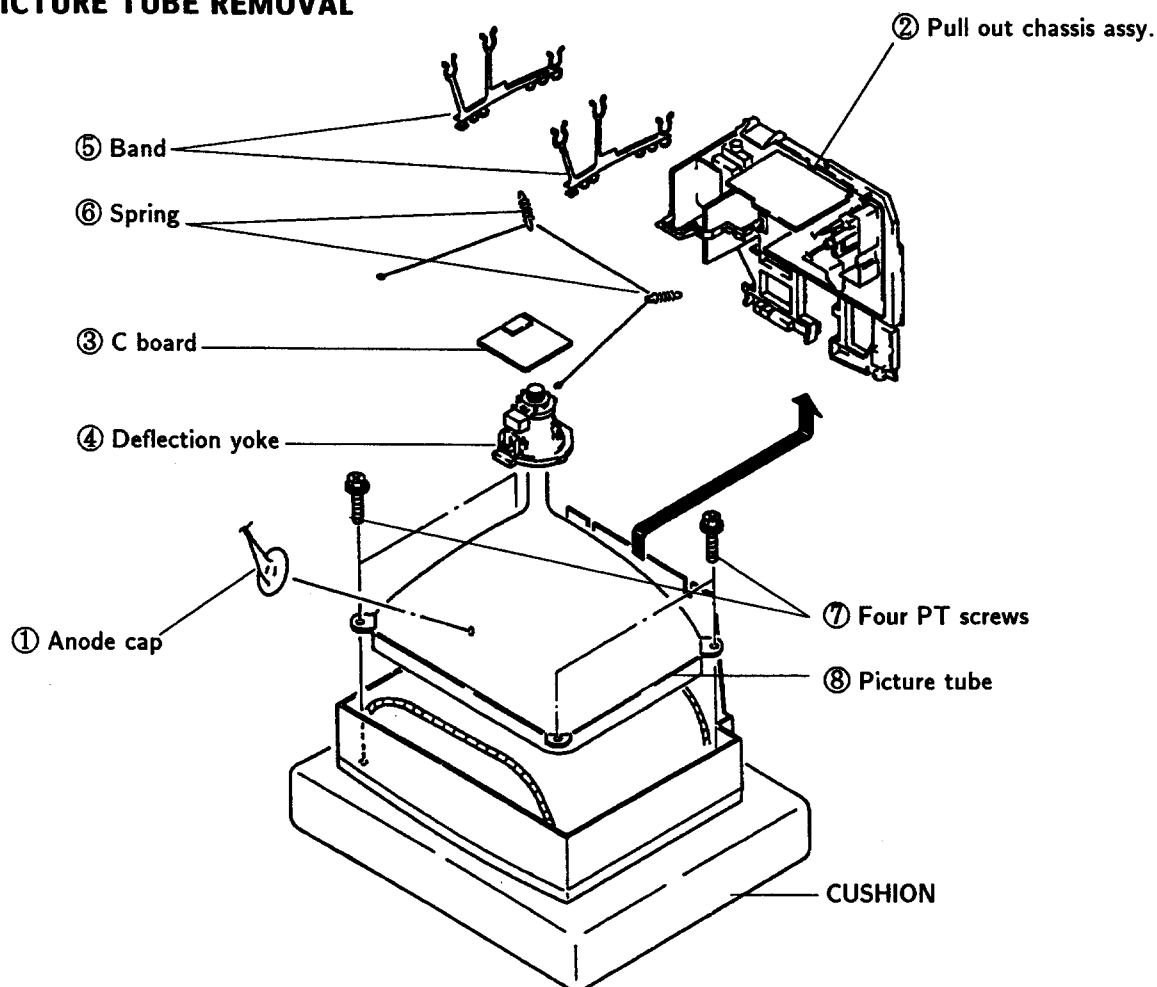


2-5. SERVICE POSITION

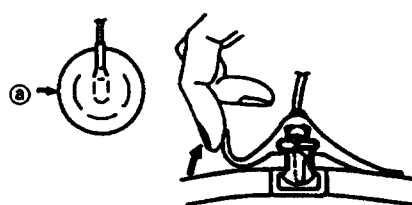
* Remove the connector bracket and then perform the following servicing.
(Refer to 2-2. CHASSIS ASSEMBLY REMOVAL.)



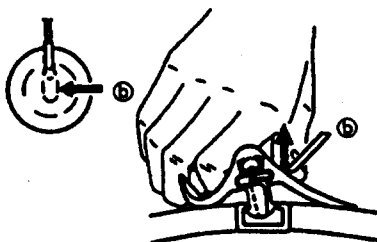
2-6. PICTURE TUBE REMOVAL



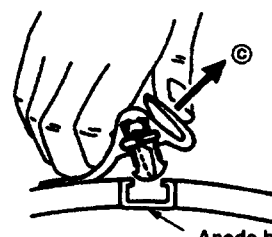
• REMOVAL OF ANODE-CAP • REMOVING PROCEDURES



① Turn up one side of the rubber cap in the direction indicated by the arrow ①.



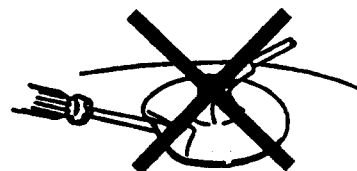
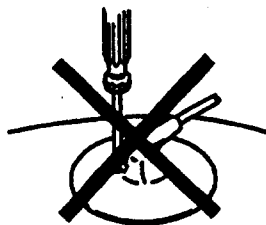
② Using a thumb pull up the rubber cap firmly in the direction indicated by the arrow ②.



③ When one side of the rubber cap is separated from the anode button, the anode-cap can be removed by turning up the rubber cap and pulling up it in the direction of the arrow ③.

• HOW TO HANDLE AN ANODE-CAP

- ① Don't hurt the surface of anode-caps with sharp shaped material!
- ② Don't press the rubber hardly not to hurt inside of anode-caps!
A material fitting called as shatter-hook terminal is built in the rubber.
- ③ Don't turn the foot of rubber over hardly!
The shatter-hook terminal will stick out or hurt the rubber.



SECITON 3 SET-UP ADJUSTMENTS

- When complete readjustment is necessary or a new picture tube is installed, carry out the following adjustments.
- Unless there is specific instruction to the contrary, carry out these adjustments with the rated power supply.
- Unless there is specific instruction to the contrary, set the controls and switches this way :
 - Contrast80%
(or remote control normal)
 - ⚙ Brightness50%

- Carry out the following adjustments in this order:
 1. Beam landing
 2. Convergence
 3. Focus
 4. White balance

Note : Testing equipment required

1. Color bar/pattern generator
2. Degausser
3. DC power supply
4. Digital multimeter
5. Oscilloscope

Preparations :

- In order to reduce the influence of geomagnetism on the set's picture tube face it east or west.
- Switch on the set's power and degauss with the degausser.

3-1. BEAM LANDING

1. Input the white signal with the pattern generator.

Contrast	}	normal
Brightness		
2. Set the pattern generator raster signal to red.
3. Move the deflection yoke to the rear and adjust with the purity control so that the red is at the center and the blue and the green take up equally sized areas on each side.
(See Figures 3-1 through 3-3.)
4. Move the deflection yoke forward and adjust so that entire screen is red. (See Figure 3-1.)
5. Switch the raster signal to blue, then to green and verify the condition.
6. When the position of the deflection yoke has been decided, fasten the deflection yoke with the screws.
7. If the beam does not land correctly in all the corners, use a magnet to adjust it.
(See Figure 3-4.)

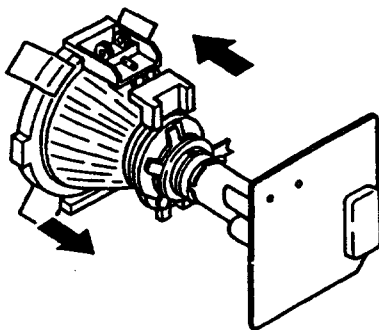


Fig. 3-1

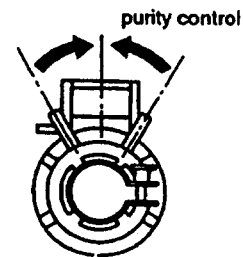


Fig. 3-2

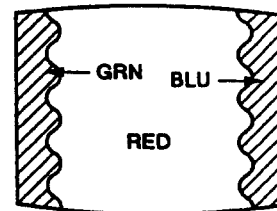


Fig. 3-3

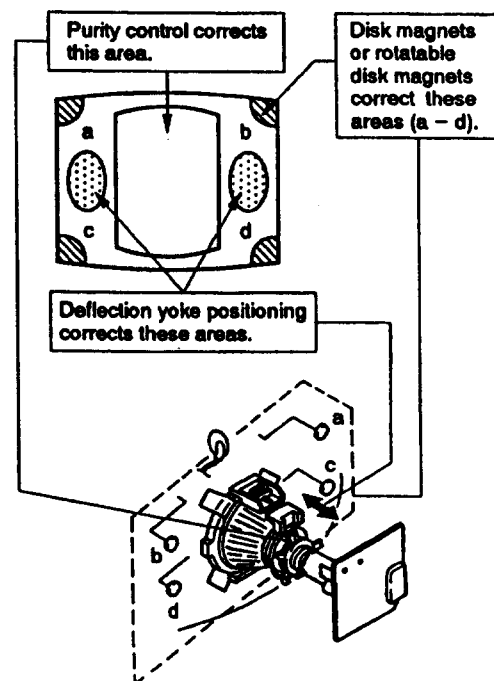


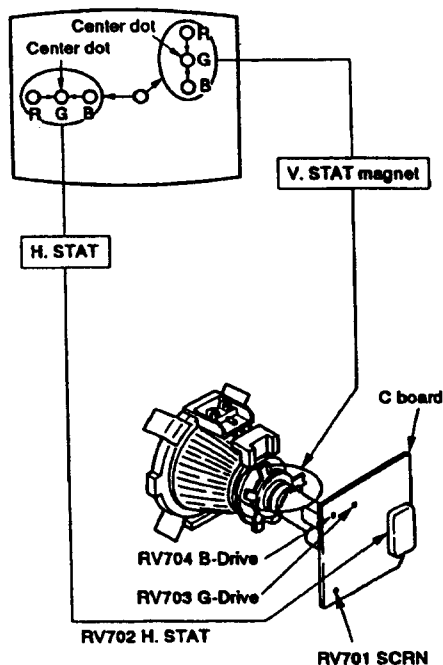
Fig. 3-4

3-2. CONVERGENCE

Preparations :

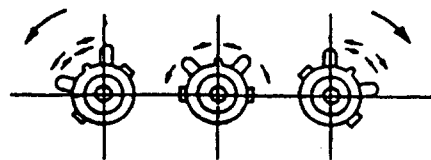
- Before starting this adjustment, adjust the focus, horizontal size, and vertical size.
- Minimize the brightness setting.
- Provide dot pattern.

(1) Horizontal and vertical static convergence

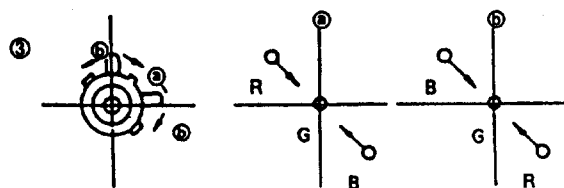
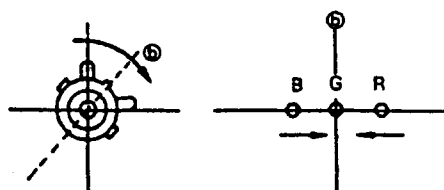
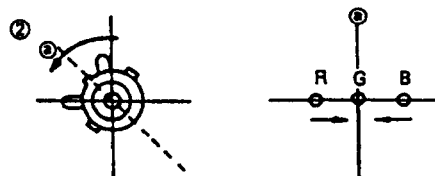
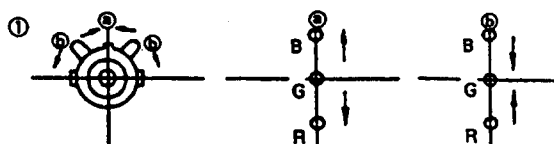


1. (Moving horizontally), adjust the H.STAT control so that the red, green, and blue points are on top of each other at the center of the screen.
2. (Moving vertically), adjust the V.STAT magnet so that the red, green, and blue points are on top of each other at the center of the screen.
3. If the H.STAT variable resistor can not bring the red, green, and blue points together at the center of the screen, adjust the horizontal convergence with the H.STAT variable resistor and the V. STAT magnet in the manner given below.
(In this case, the H.STAT variable resistor and the V. STAT magnet influence each other's settings.)

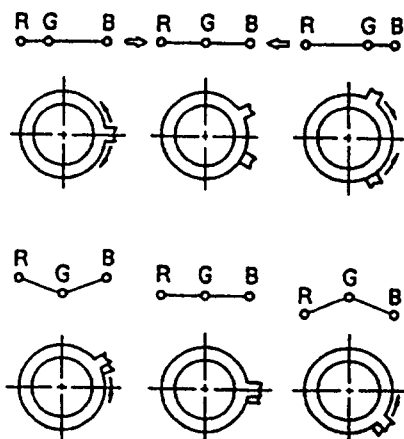
- Tilt the V.STAT magnet and adjust the static convergence by opening or closing the V.STAT magnet.



4. If the V.STAT magnet is moved in the direction of the ㉓ and ㉔ arrows, the red, green, and blue points move as shown below.

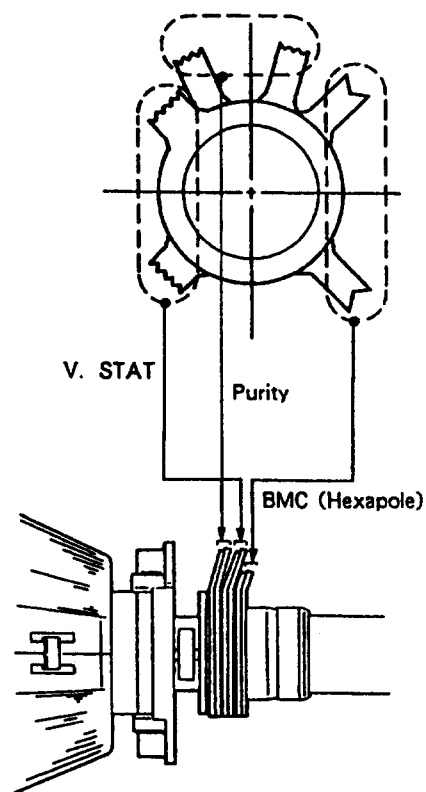


- Operation of BMC (Hexapole) Magnet



- The respective dot operations resulting from the operation of each magnet are not completely independent, so be sure to perform adjustment while tracking.

Use the H.STAT VR to adjust the red, green, and blue dots so they coincide at the center of screen (by moving the dots in the horizontal direction).



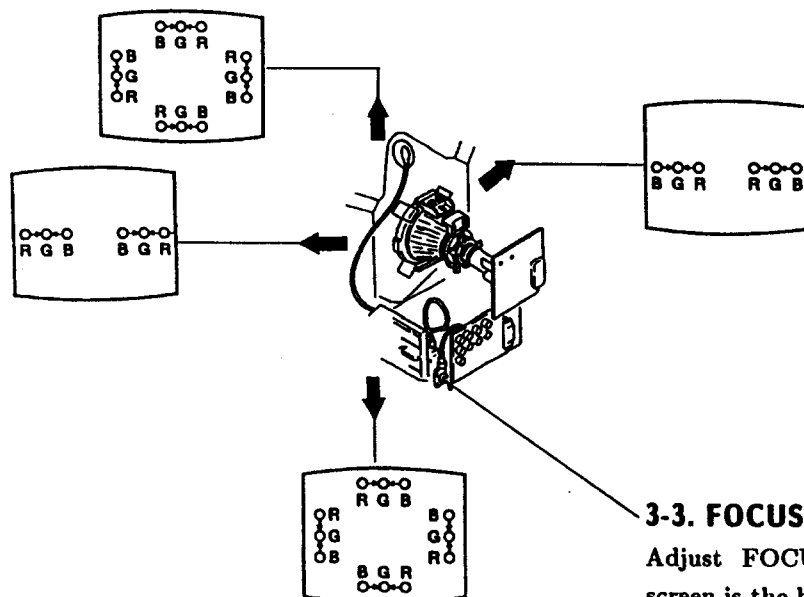
(2) Dynamic convergence adjustment

Preparations :

Before starting this adjustment, adjust the horizontal static convergence and the vertical static convergence.

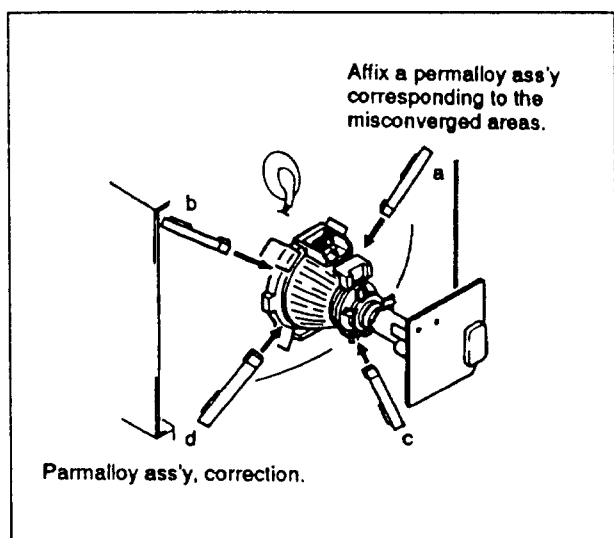
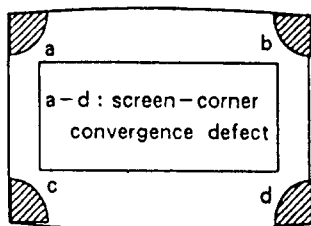
1. Slightly loosen the deflection yoke screws.
2. Remove the deflection yoke spacer.

3. Move the deflection yoke as shown in the figure below and optimize the convergence.
4. Tighten the deflection yoke screws.
5. Install the deflection yoke spacer.



3-3. FOCUS

Adjust FOCUS so that the whole screen is the best focus.

(3) Screen corner convergence**3-4. WHITE BALANCE****[Screen G2 setting]**

1. Input the dot signal from the pattern generator.
2. Set the picture brightness control to its lowest level.
3. Apply 170V DC to the R, G, and B cathodes with an external power supply.
4. While watching the picture, adjust G2 control RV701 (Screen) to the point just before the return lines disappear.

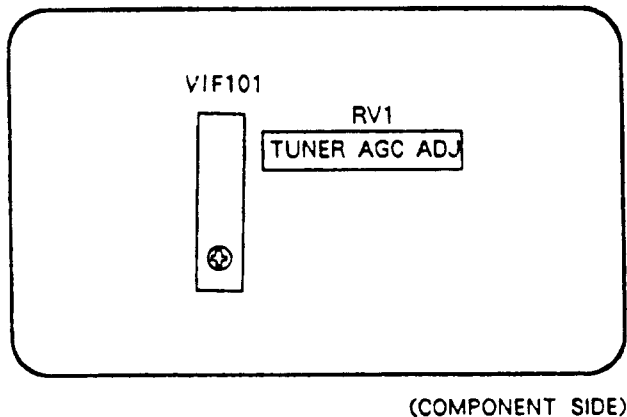
[White balance adjustment]

1. Input an all-white signal from the pattern generator.
2. Set the picture brightness and color controls to their normal levels.
3. Use the RV704 (B Drive) and RV703 (G Drive) to adjust white balance.

In the adjustments below, have the picture color and brightness settings at their normal levels unless there is a specific instruction to the contrary.

SECTION 4 CIRCUIT ADJUSTMENTS

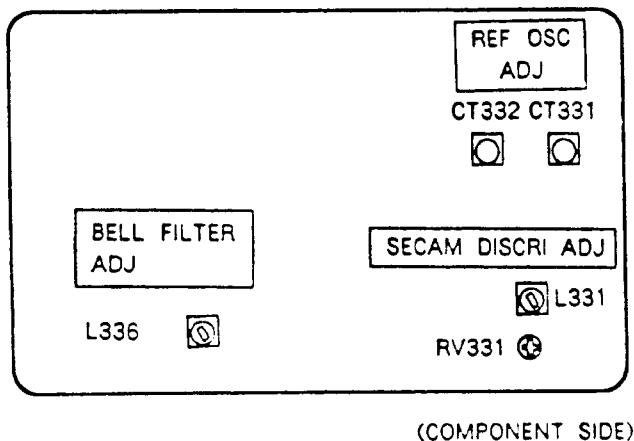
4-1. A BOARD ADJUSTMENT



TUNER AGC ADJUSTMENT (VIF101, RV1)

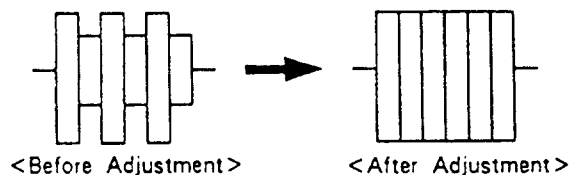
1. Align with an appropriate signal between stations.
2. Adjust RV1 so that snow noise and cross modulation just disappear from the picture.

4-2. B BOARD ADJUSTMENTS



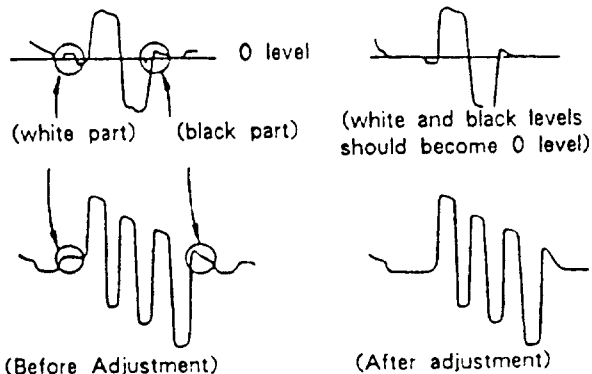
BELL FILTER ADJUSTMENT (L336)

1. Input a SECAM color bar signal.
2. Connect the oscilloscope to the emitter of Q335.
3. Adjust L336 so that the waveform is flat.



DISCRIMINATION ADJUSTMENT (RV331 and L331)

1. Input a SECAM color bar signal.
2. Connect the oscilloscope to pin ① of IC331.
3. Adjust RV331 so that the white and black sections of the waveform at pin ① come to the 0 level.
4. Connect the oscilloscope to pin ③ of IC331.
5. Adjust L331 so that the white and black sections of the waveform at pin ③ come to the 0 level.



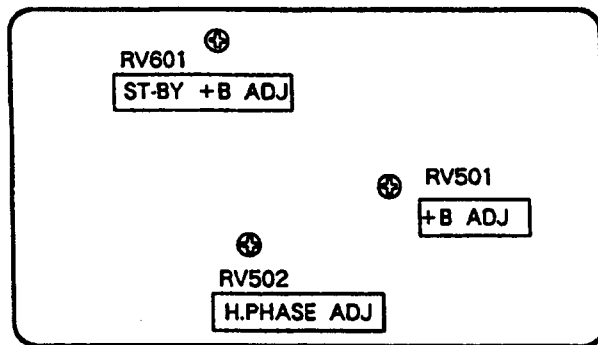
REFERENCE OSCILLATOR ADJUSTMENT (CT332 8.8MHz)

1. Input a PAL color bar signal.
2. Ground pin ⑪ of the IC331.
3. Adjust CT332 to obtain synchronization.

REFERENCE OSCILLATOR ADJUSTMENT (CT331 7.16MHz)

1. Input an NTSC color bar signal.
2. Ground pin ⑪ of IC331.
3. Adjust the CT331 to obtain synchronization.
4. Remove the jumper grounding pin ⑪ of IC331.

4-3. D BOARD ADJUSTMENTS



+B ADJUSTMENT (RV501)

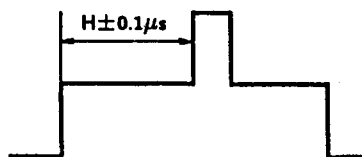
1. Connect the digital multimeter to TP91.
2. Adjust RV501 to obtain $135 \pm 0.2V$.

ST-BY +B ADJUSTMENT (RV601)

1. Put the system into ⏻ standby mode (remote commander).
2. Connect the digital multimeter to TP91.
3. Adjust RV601 to obtain $135 \pm 3V$.
4. Take the system out of ⏻ standby mode (remote commander).

H.PHASE ADJUSTMENT (RV502)

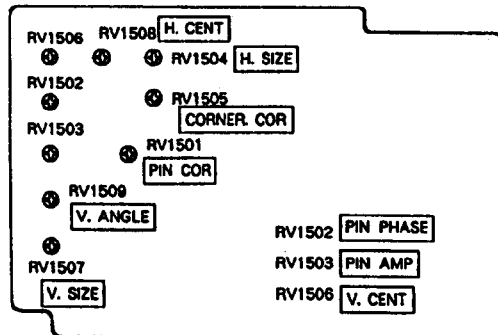
1. Input a PAL color bar signal.
2. Set the picture and brightness controls to their normal levels.
3. Set RV1508 (H.CENT) to its mechanical center.
4. Connect the oscilloscope to pin ⑪ (SCP) of IC 501.
5. Rotate RV502 to adjust to $H \pm 0.1\mu s$.
See below table for the H value.



Standard of H.Phase

Model Size	H
21"	$5.6\mu s$
25"	$5.1\mu s$
29"	$5.5\mu s$

4-4. J1 BOARD ADJUSTMENTS



RV1508 H. CENT (HORIZONTAL CENTER)



RV1504 H. SIZE (HORIZONTAL SIZE)



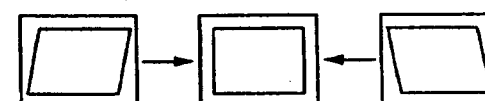
RV1506 V. CENT (VERTICAL CENTER)



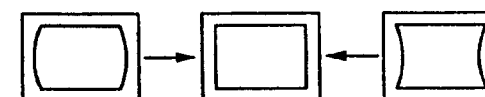
RV1507 V. SIZE (VERTICAL SIZE)



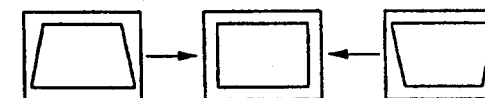
RV1509 V. ANGLE (VERTICAL ANGLE)



RV1503 PIN AMP (PINCUSHION AMPLIFIER)



RV1502 PIN PHASE (PINCUSHION PHASE)



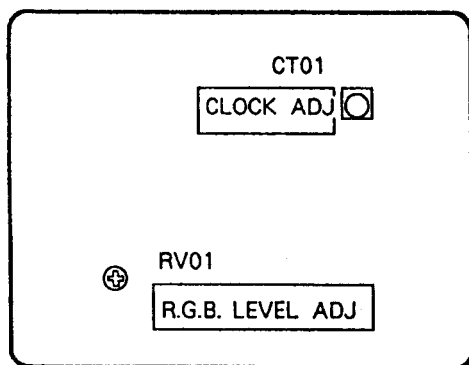
RV1501 PIN. COR (PINCUSHION CORRECT)



RV1505 CORNER COR (CORNER CORRECT)



4-5. V BOARD ADJUSTMENTS



CLOCK ADJUSTMENT (CT01)

1. Remove the V-1 connector.
2. Put the system into text mode.
3. Adjust CT01 so that the picture does not move.

RGB LEVEL ADJUSTMENT (RV01)

1. Maximize the picture setting.
2. Adjust RV01 so that the RGB output is 0.75V.

4-6. SECONDARY ADJUSTMENT

SUB BRIGHTNESS ADJUSTMENT

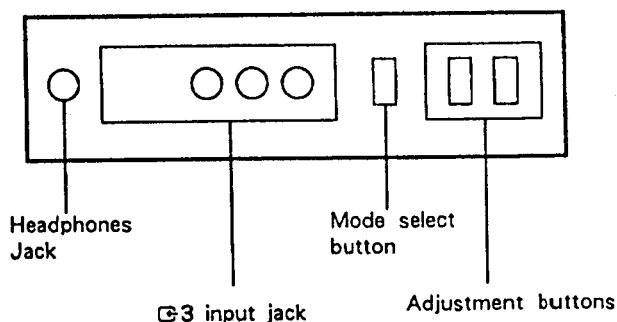
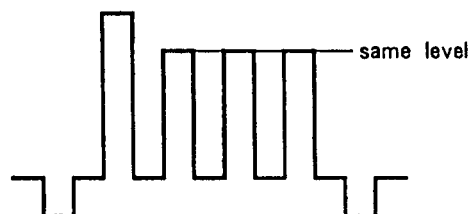
1. Set the system to receive a test pattern.
2. Press $\rightarrow \cdot \leftarrow$ on the remote commander to put the system into normal mode.
3. Switch off the power.
4. While depressing the adjusting buttons + and - simultaneously, turn on the power. (SUB mode is obtained)
5. Minimize the \odot contrast setting.
6. Adjust the \odot brightness control so that the gray scale 0 IRE section is cut off completely and the 20 IRE section is barely glowing.
7. Depress the \diamond (store) button of the remote commander. (SUB mode is released)

If there is no test color pattern

1. Set the system to receive a color pattern.
2. Press on the remote commander to put system into normal mode.
Set the \odot color to its normal state.
- 3-5. are the same as above.
6. Since 20 IRE is nearly blue, adjust the \odot brightness control so that the blue barely glows.
7. is the same as above.
8. Press $\rightarrow \cdot \leftarrow$ on the remote commander to put the system into normal mode.

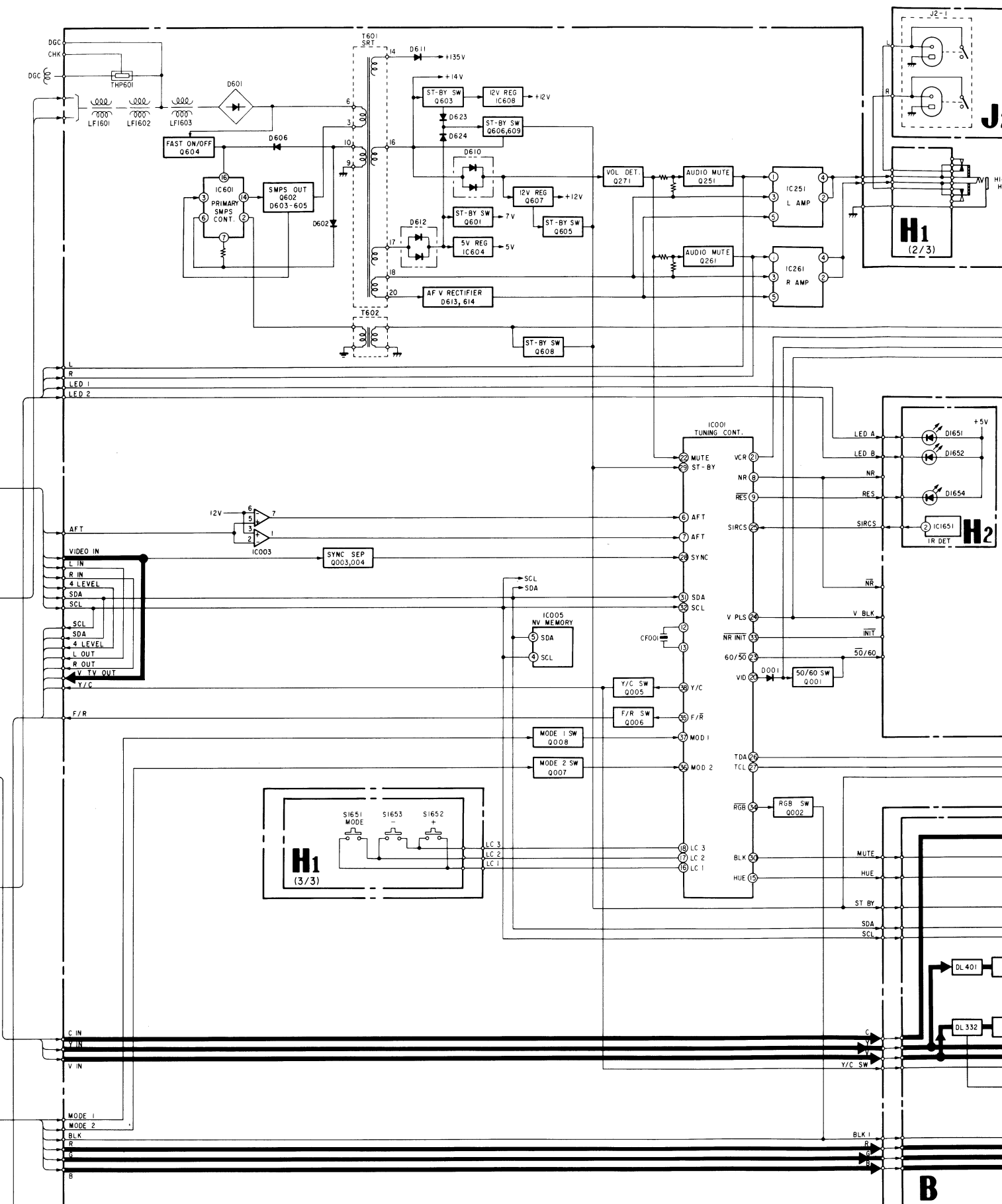
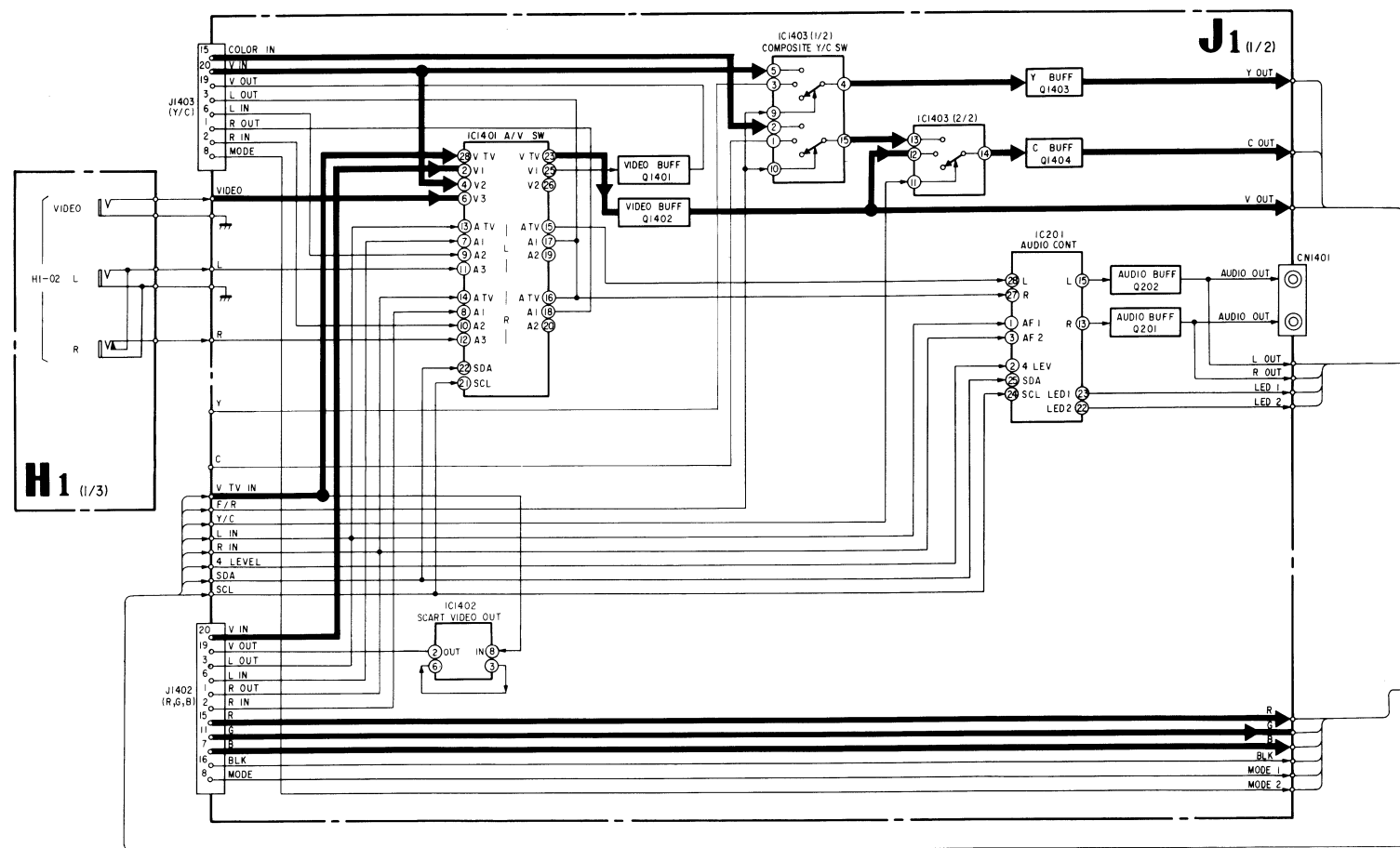
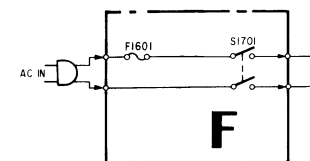
SUB COLOR ADJUSTMENT

1. Set the system to receive color bars.
2. Press $\rightarrow \cdot \leftarrow$ on the remote commander to put the system into normal mode.
3. Cut off the power.
4. While depressing the adjustment buttons + and - simultaneously, turn on the power. (SUB mode is obtained)
5. Adjust the color control so that the B out waveform (pin ② of C board connector CNC72) is as shown in the figure below.
6. Depress the \diamond (store) button of the remote commander. (SUB mode is released)



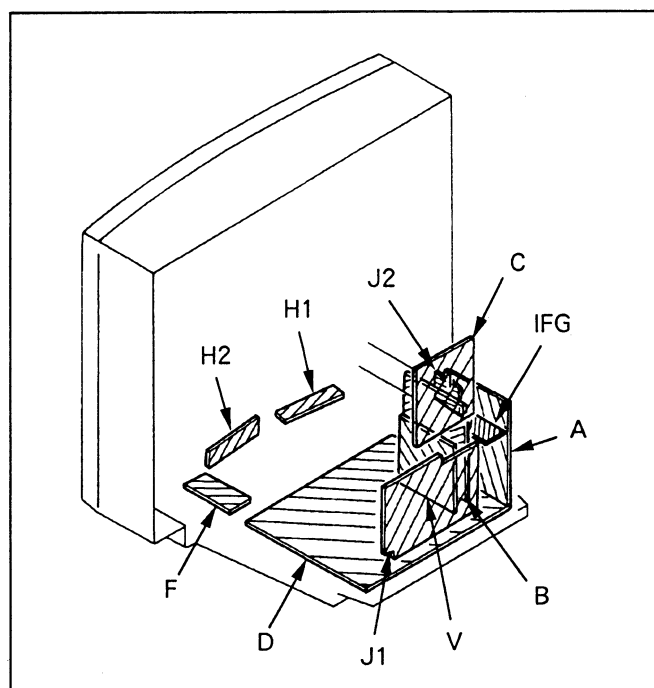
MEMO


Handwriting practice lines (dotted lines).





5-2. CIRCUIT BOARDS LOCATION








Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

Note :

- All capacitors are in μF unless otherwise noted.
pF : μF 50WV or less are not indicated except for electrolytics.
- Indication of resistance, which does not have one for rating electrical power, is as follows.

Pitch : 5mm
Rating electrical power : 1/4W

- Chip resistor is in 1/10W.
- All resistors are in ohms. $k\Omega = 1000\Omega$, $M\Omega = 1000k\Omega$
-  : nonflammable resistor.
-  : fusible resistor.
- Δ : internal component.
-  : panel designation and adjustment for repair.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- All voltages are in V.
- Readings are taken with a $10M\Omega$ digital multimeter.
- Readings are taken with a color-bar signal input.
- Voltage variations may be noted due to normal production tolerances.
-  : B + line.
-  : signal path.

Reference information

RESISTOR	: RN	METAL FILM
	: RC	SOLID
	: FPRD	NONFLAMMABLE CARBON
	: FUSE	NONFLAMMABLE FUSIBLE
	: RS	NONFLAMMABLE METAL OXIDE
	: RB	NONFLAMMABLE CEMENT
COIL	: RW	NONFLAMMABLE WIREWOUND
	: *	ADJUSTMENT RESISTOR
CAPACITOR	: LF-8L	MICRO INDUCTOR
	: TA	TANTALUM
	: PS	STYROL
	: PP	POLYPROPYLENE
	: PT	MYLAR
	: MPS	METALIZED POLYESTER
	: MPP	METALIZED POLYPROPYLENE
	: ALB	BIPOLAR
	: ALT	HIGH TEMPERATURE
	: ALR	HIGH RIPPLE

H1

CONTROL SW,
AV INPUT,
HEADPHONE

H2

SIRCS RECEIVER,
INDICATOR

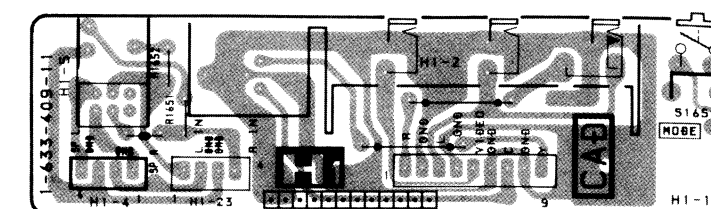
F

[A]

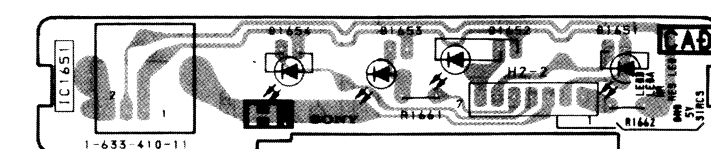
5-3. SCHEMATIC DIAGRAMS AND PRINTED WIRING BOARDS

—Conductor Side—

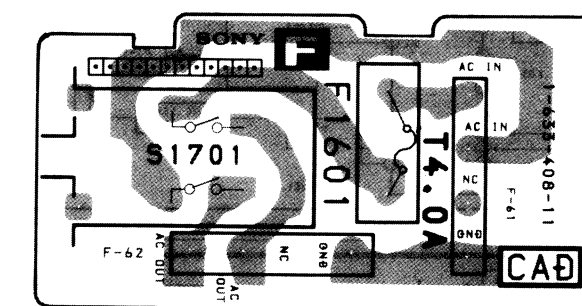
—H1 Board—



—H2 Board—



—F Board—



[CONTROL SW,
AV INPUT,
HEADPHONE

[SIRCS RECEIVER,
INDICATOR]

[AC IN POWER SW]

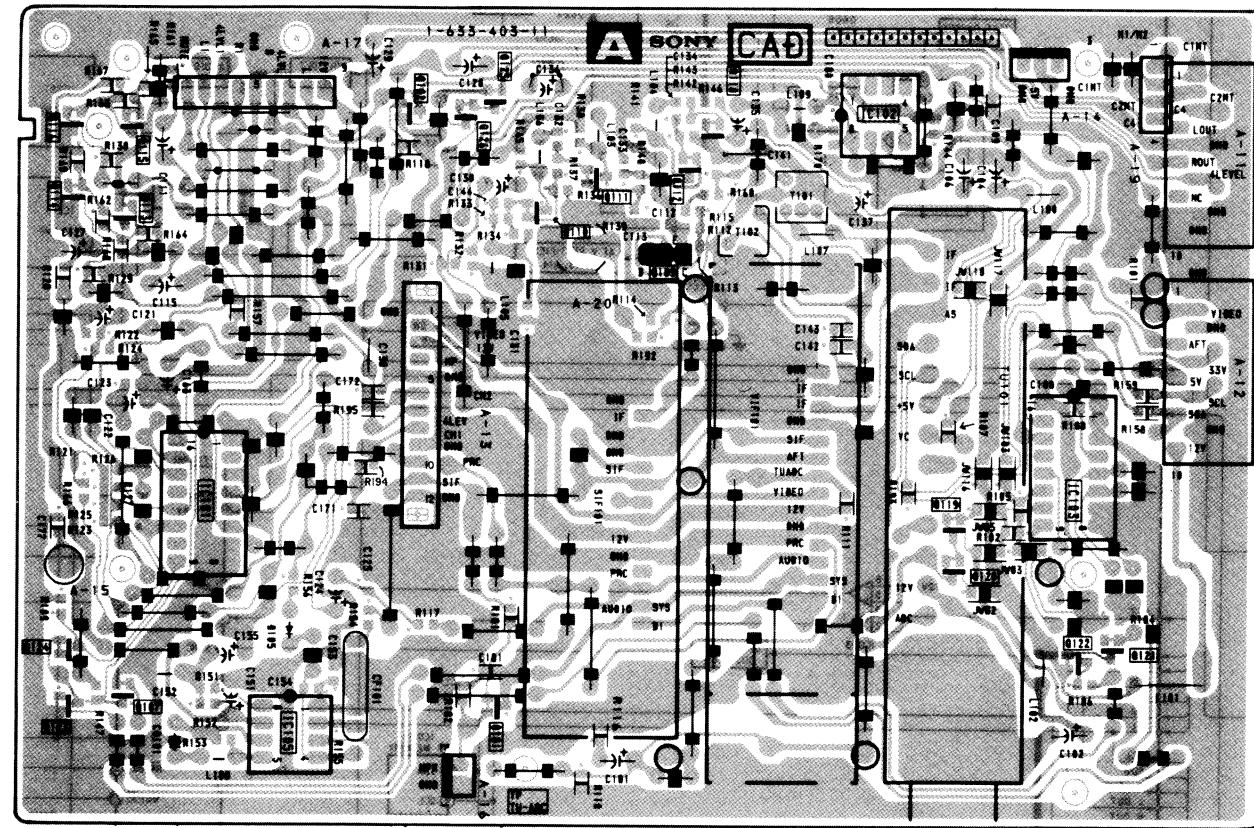
[TUNER, VIF, SIF] L

J1

—Conductor Side—

[TUNER, VIF, SIF] **A**

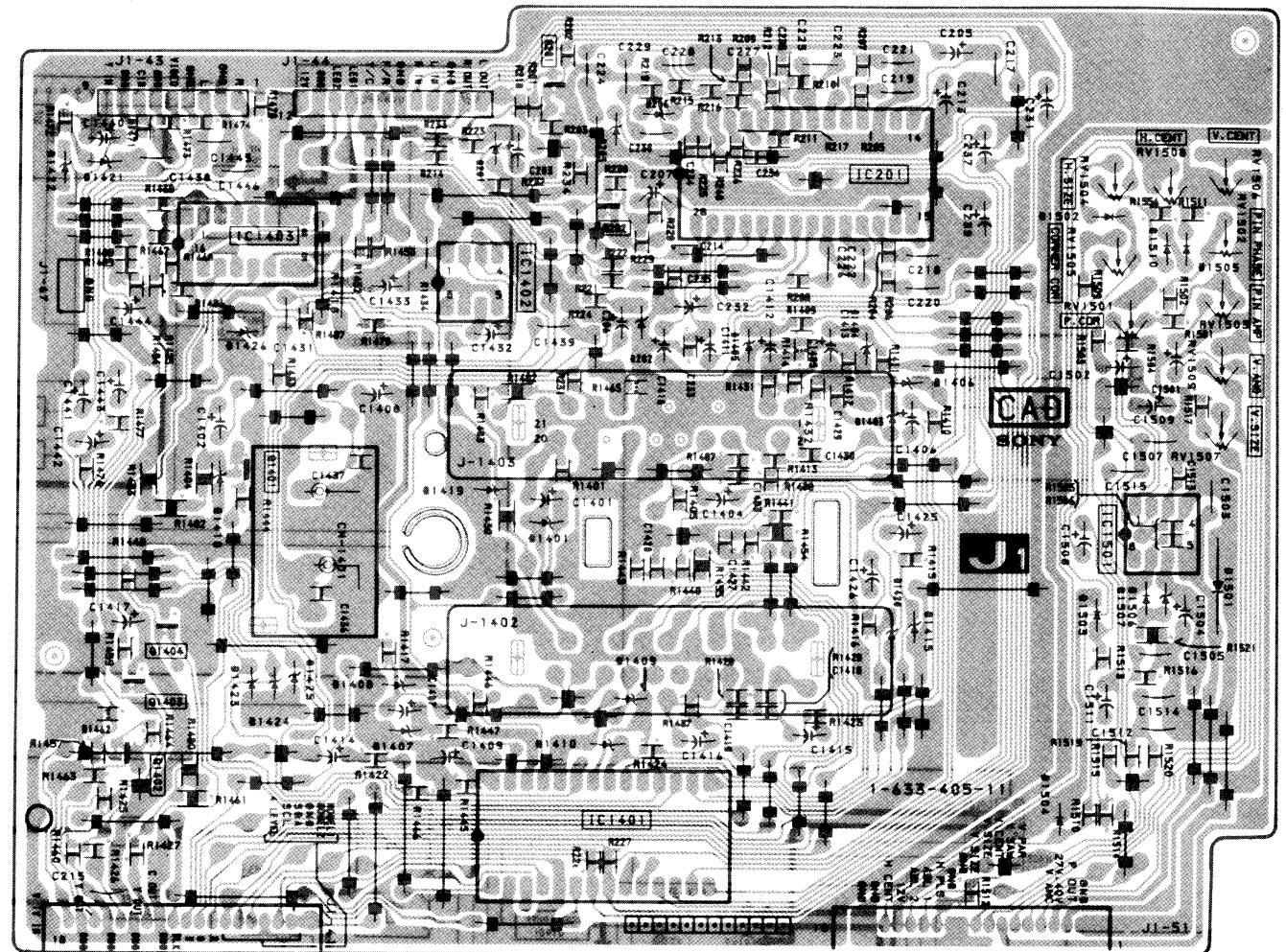
—A Board—



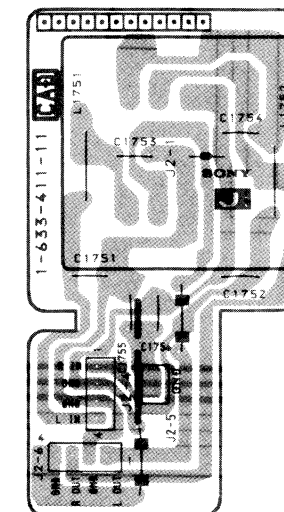
J1 [AUDIO CONTROL, AV INPUT
Y/C INPUT, SCAR VIDEO OUT
EAST-WEST CORRECTION]

J2 [SPEAKER
TERMINAL]

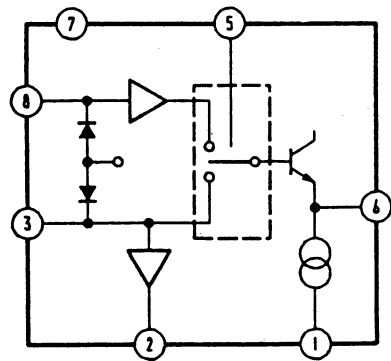
—J1 Board—



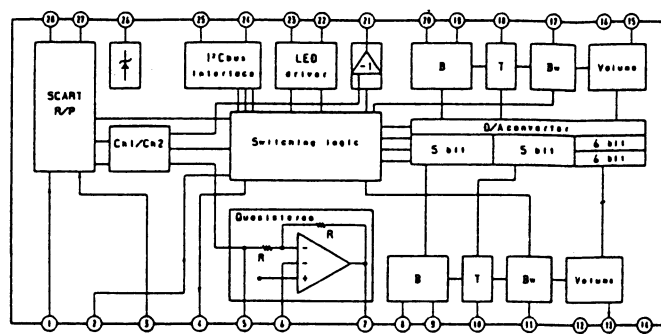
—J2 Board—



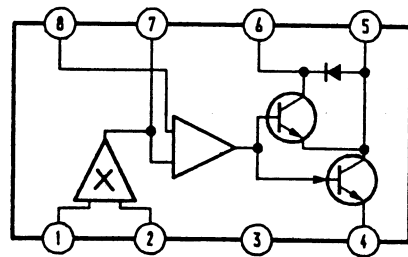
J1 BOARD IC1402 TEA2014A



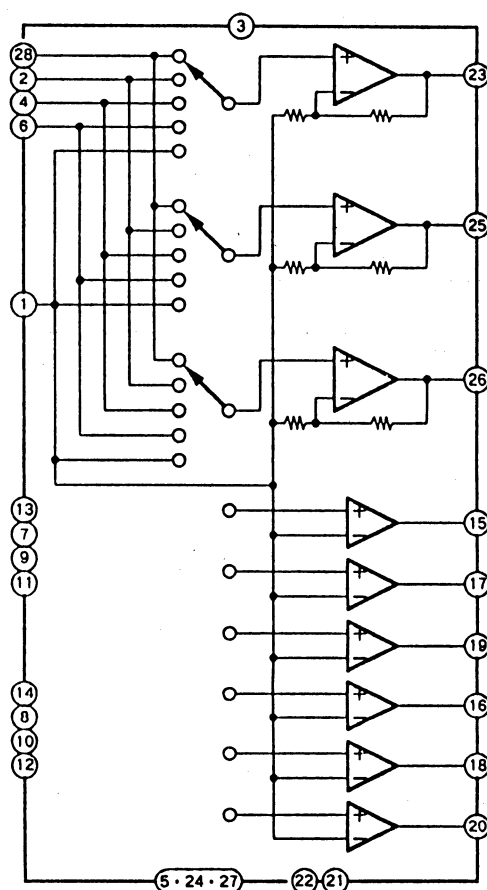
J1 BOARD IC2001 TDA6200



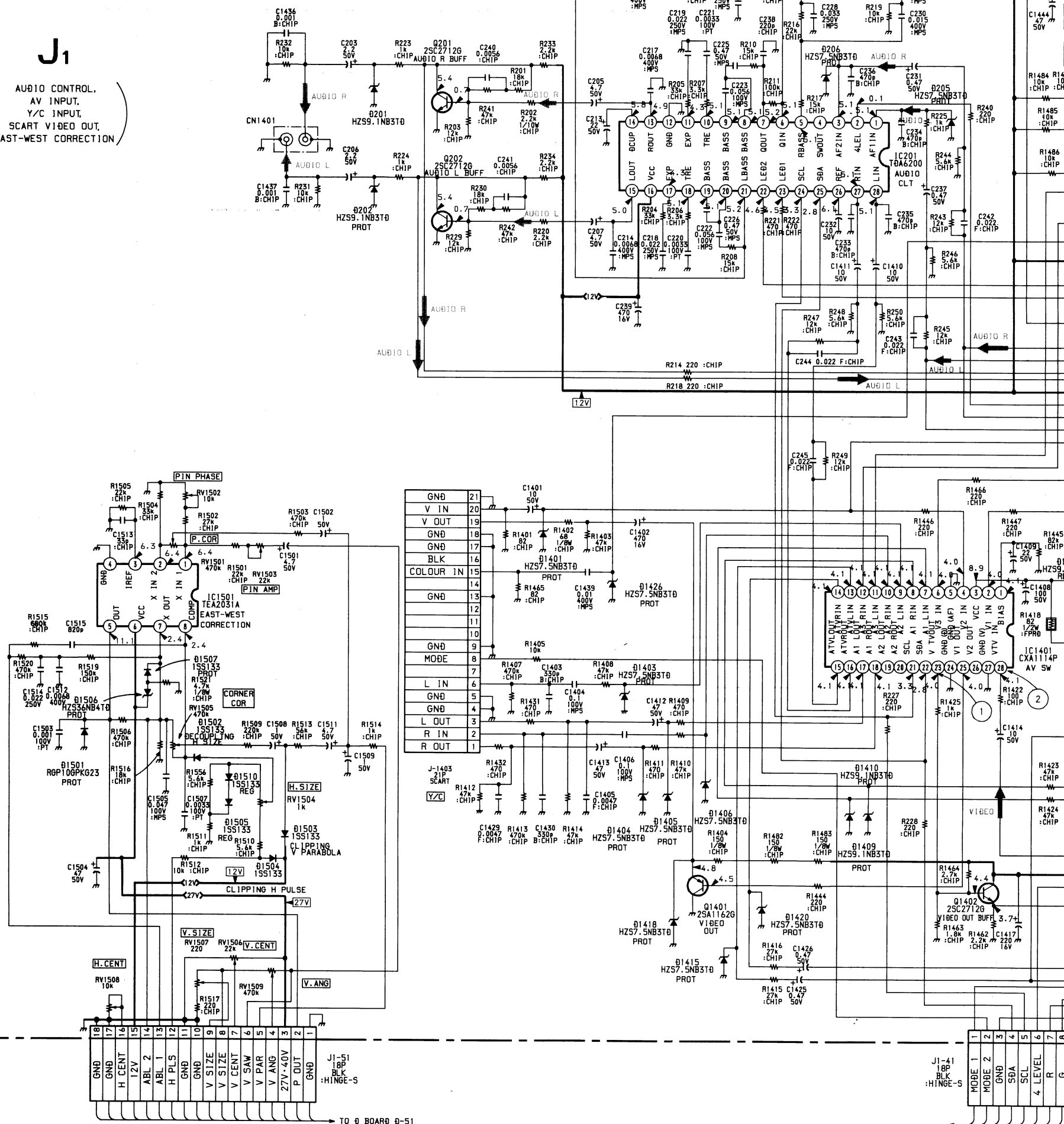
J1 BOARD IC1501 TEA2031



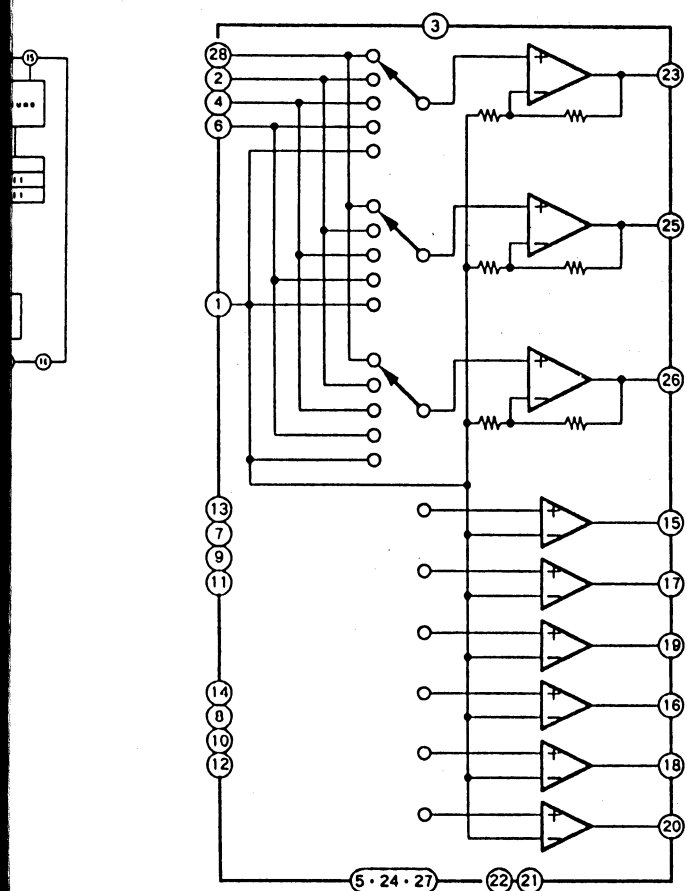
J1 BOARD IC1401 CXA1114P



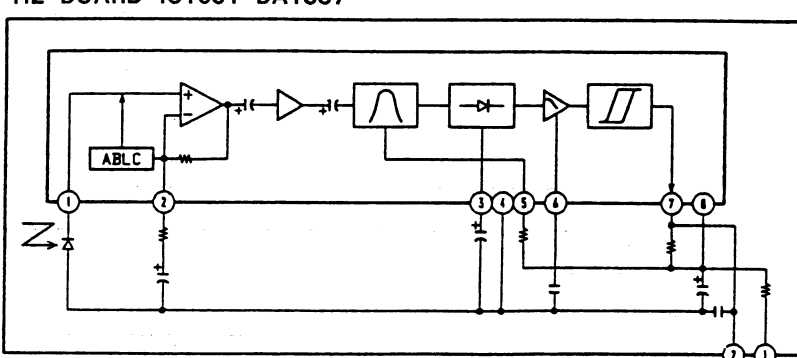
J1
AUDIO CONTROL,
AV INPUT,
Y/C INPUT,
SCART VIDEO OUT,
EAST-WEST CORRECTION



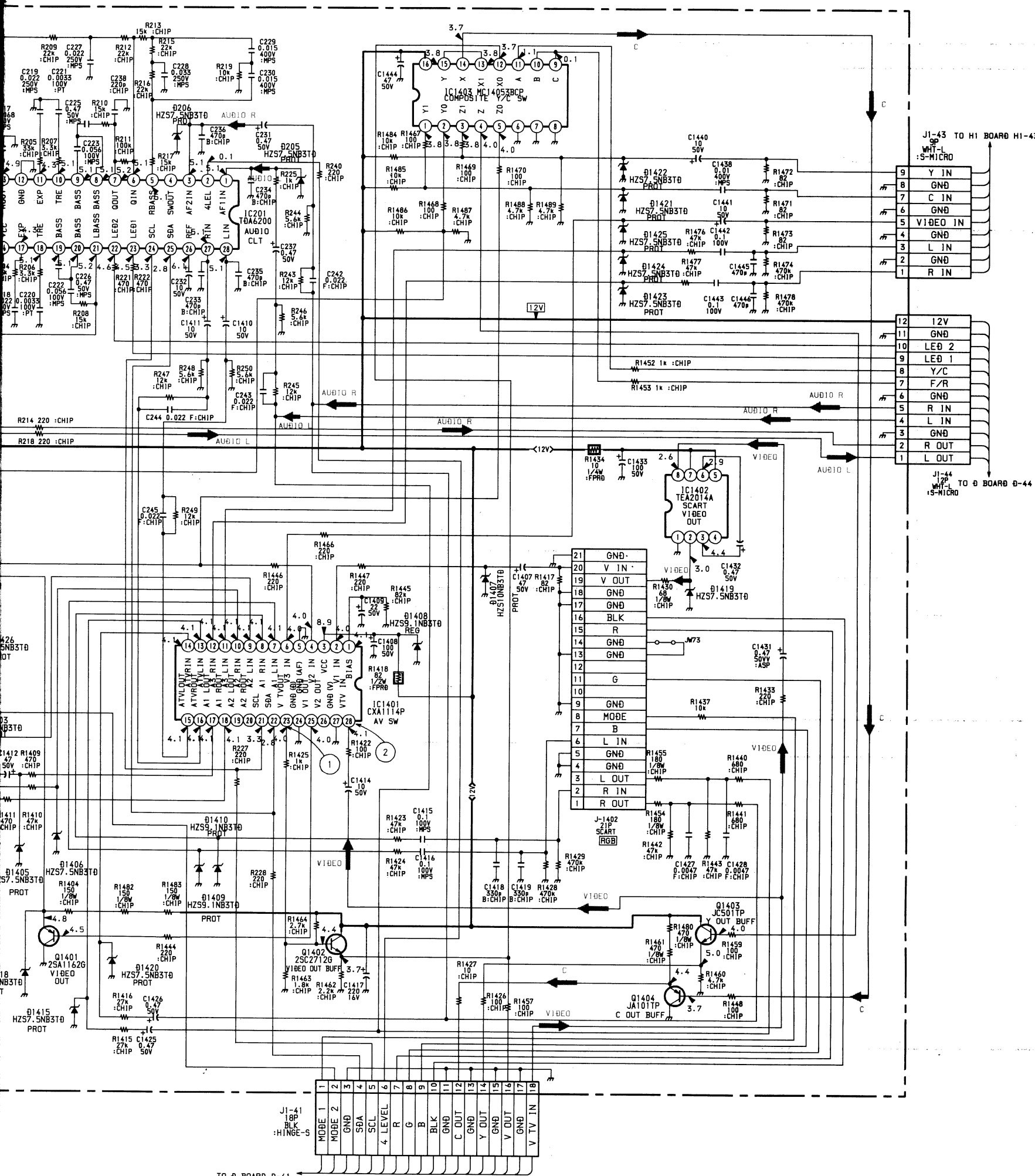
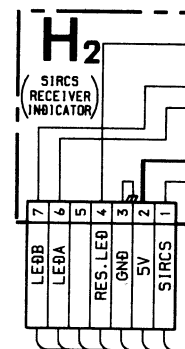
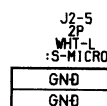
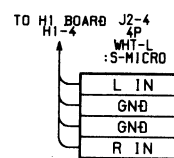
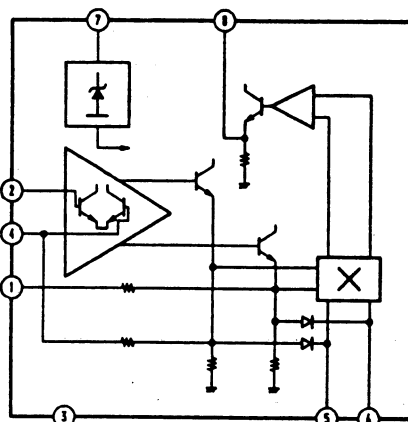
J1 BOARD IC1401 CXA1114P



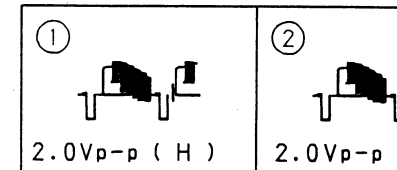
H2 BOARD IC1651 BA1387



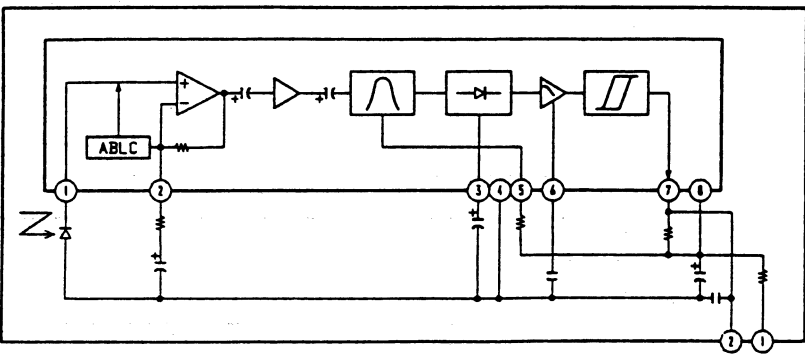
A BOARD IC105 TBA129



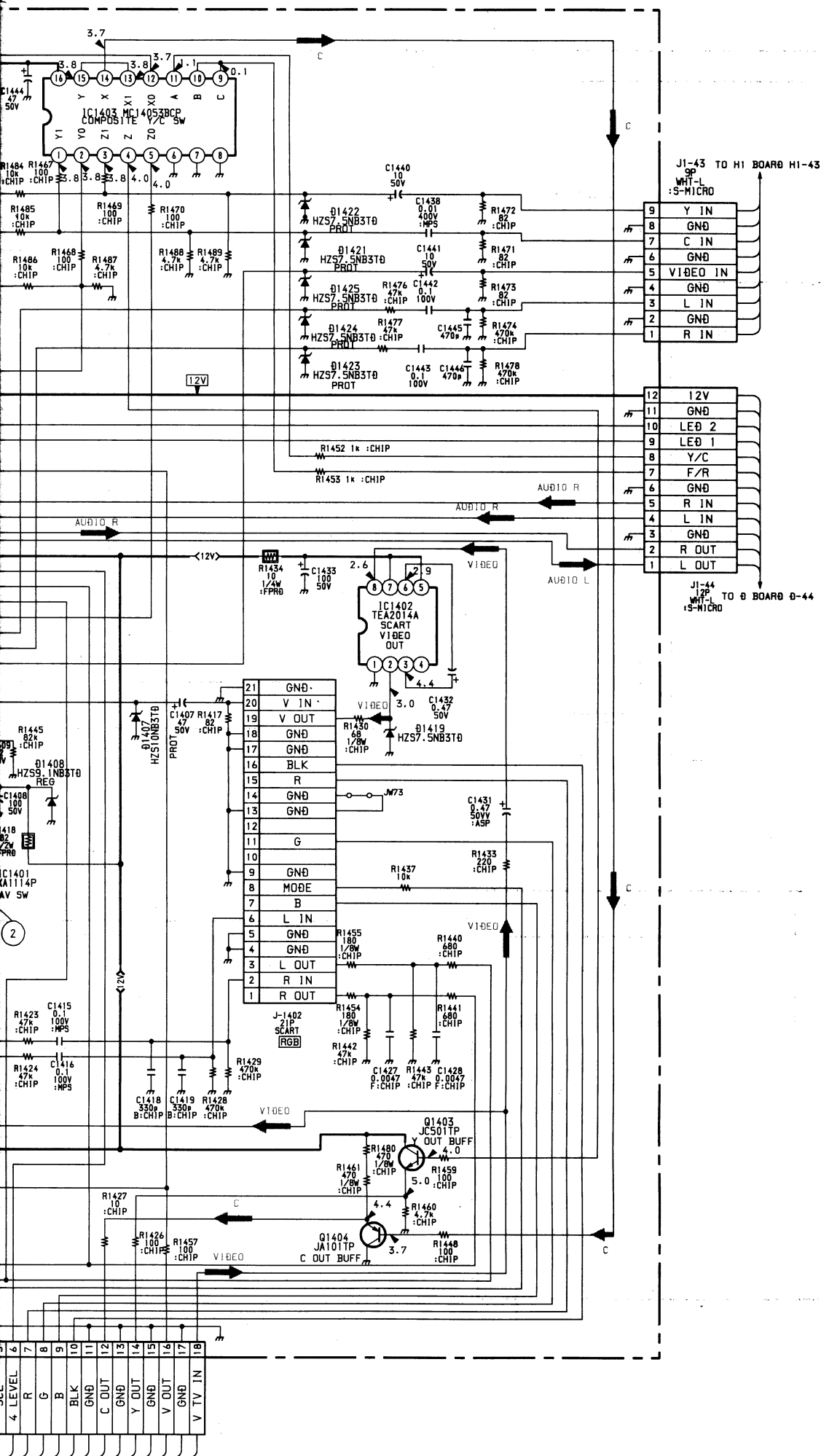
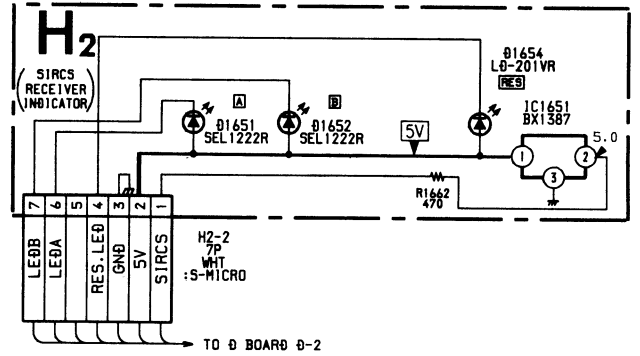
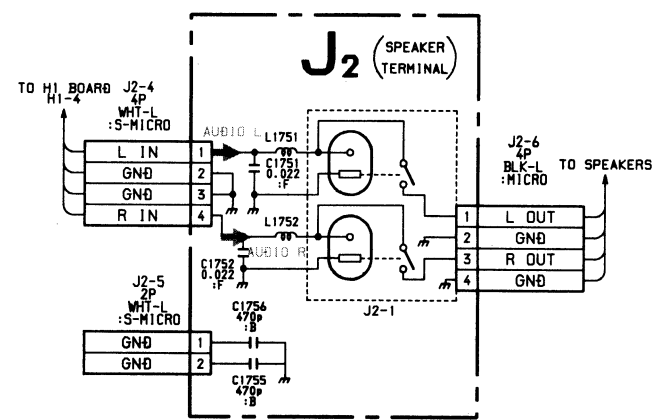
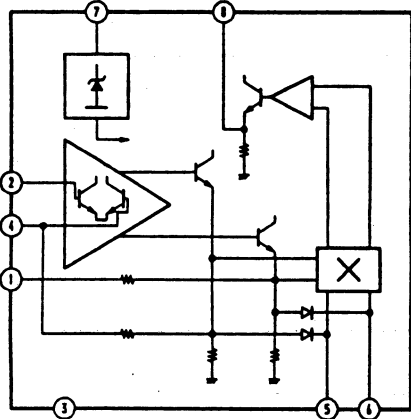
• **WAVEFORMS J1 BOARD**



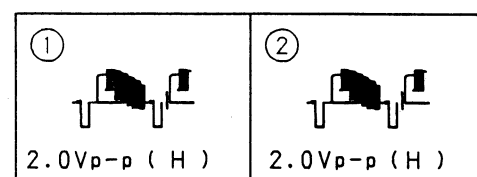
H2 BOARD IC1651 BA1387



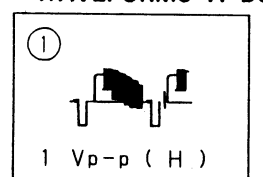
A BOARD IC105 TBA129

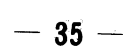
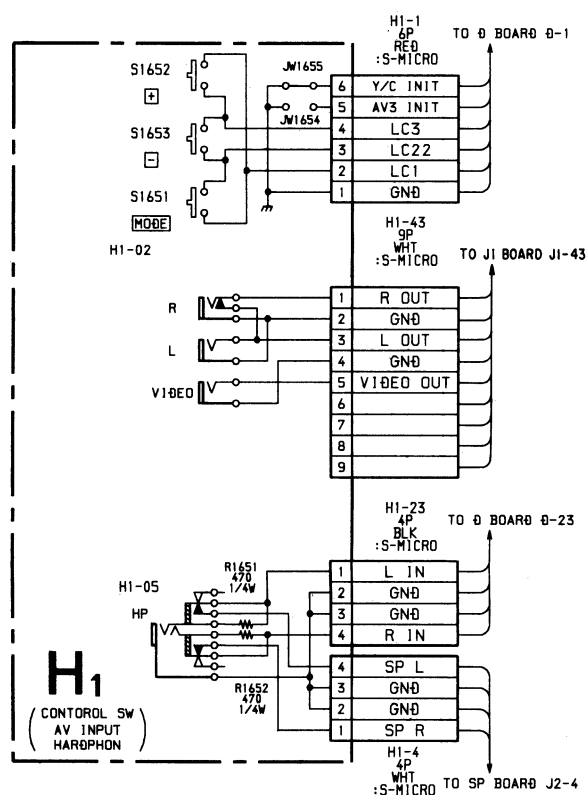


• WAVEFORMS J1 BOARD

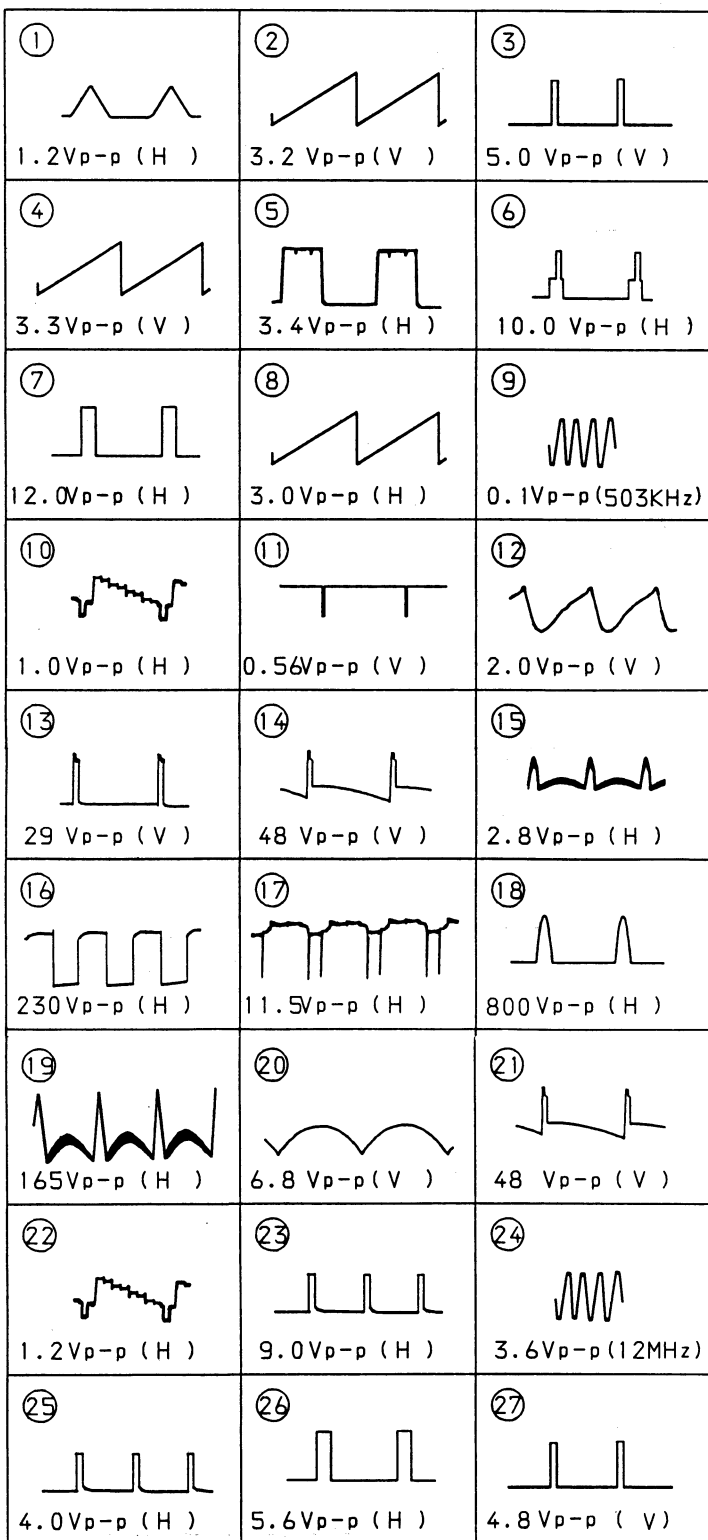


• WAVEFORMS A BOARD

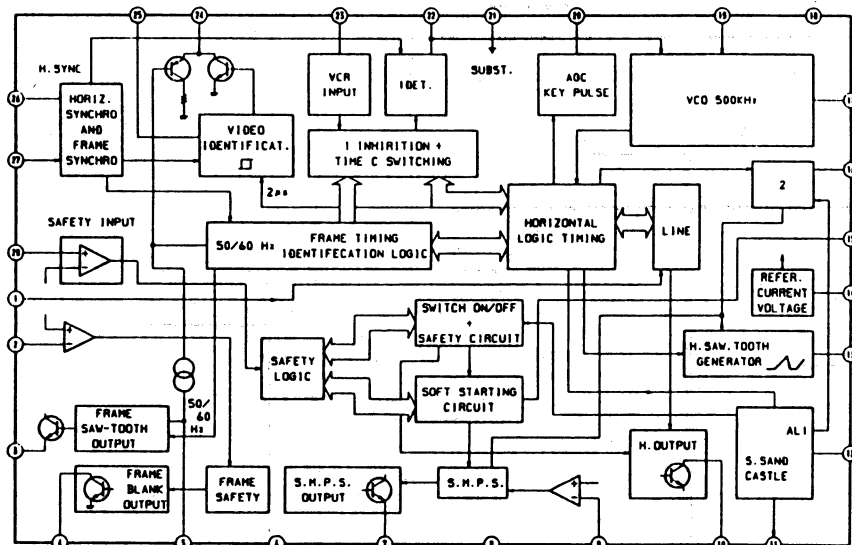




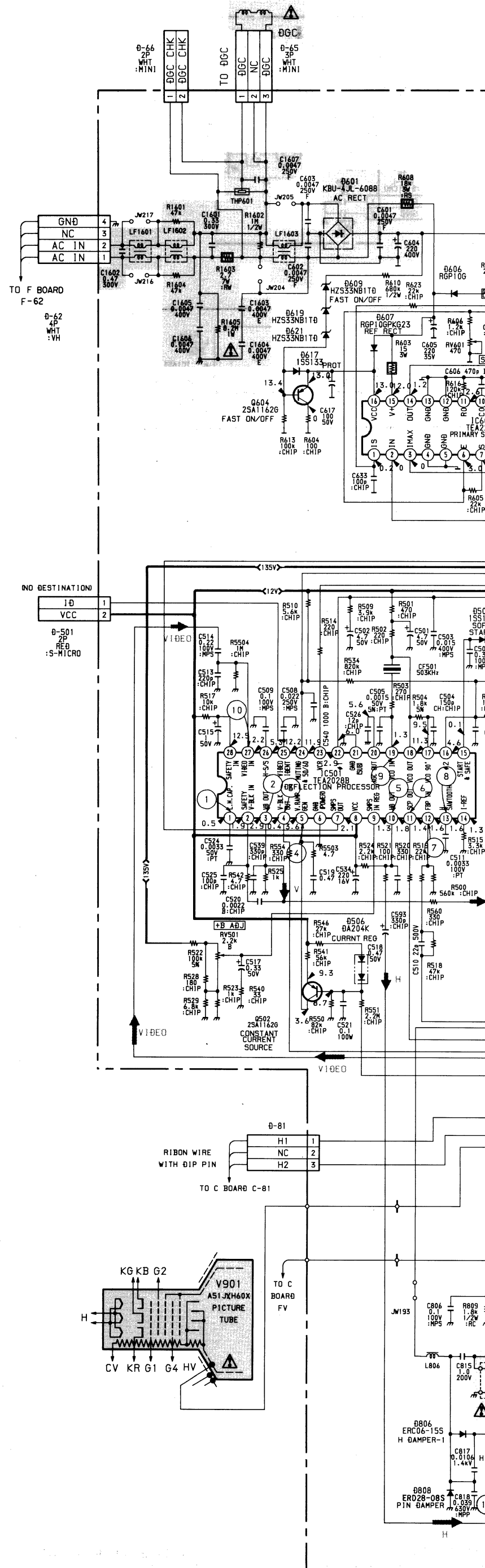
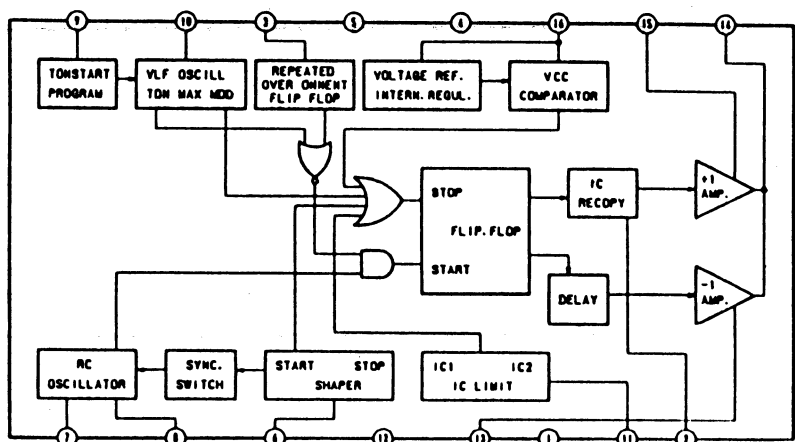
• WAVEFORMS D BOARD

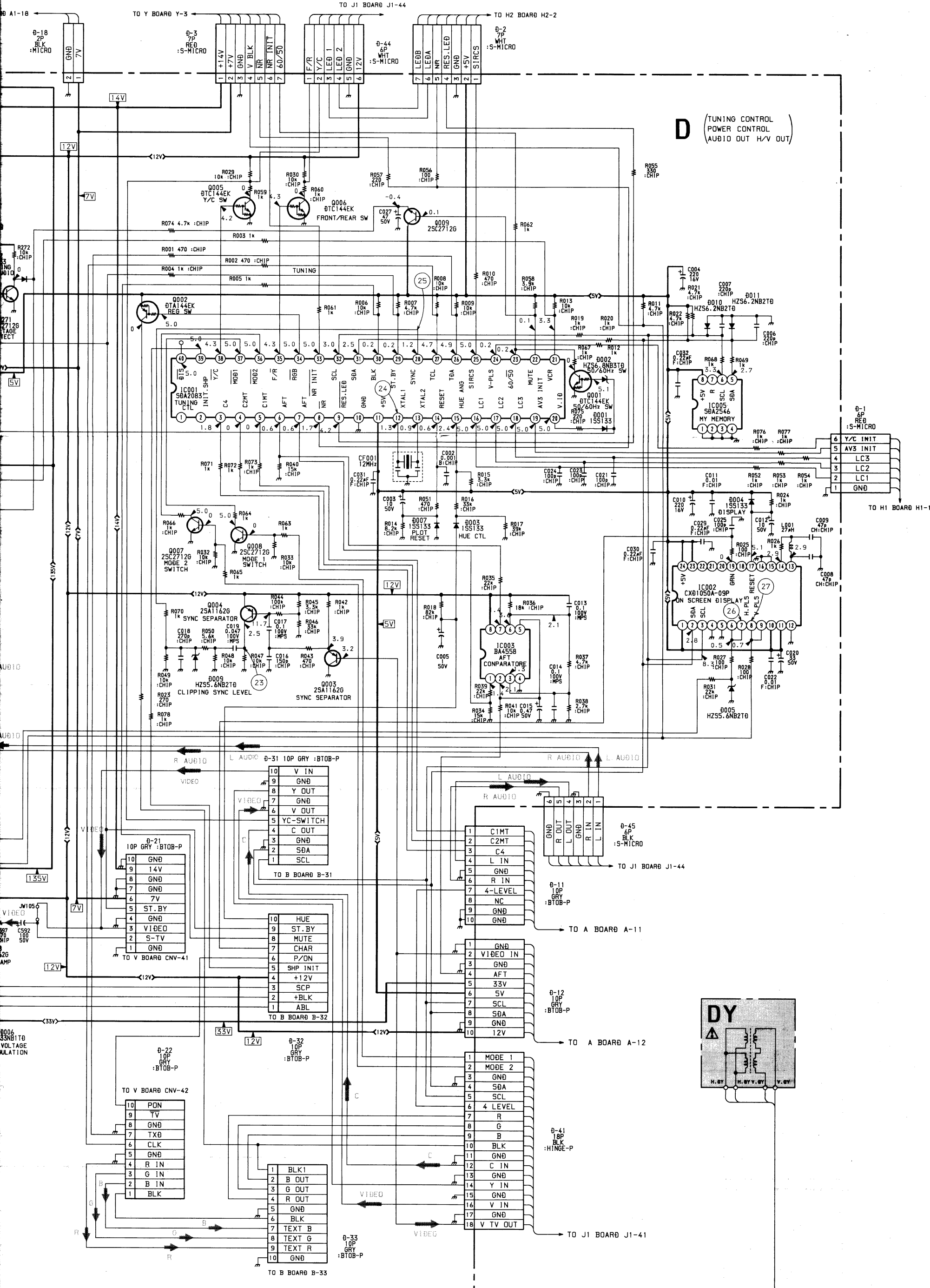


D BOARD IC501 TEA2028B

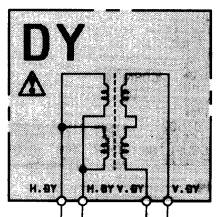


D BOARD IC601 TEA2260





D (TUNING CONTROL
POWER CONTROL
AUDIO OUT H/V OUT)

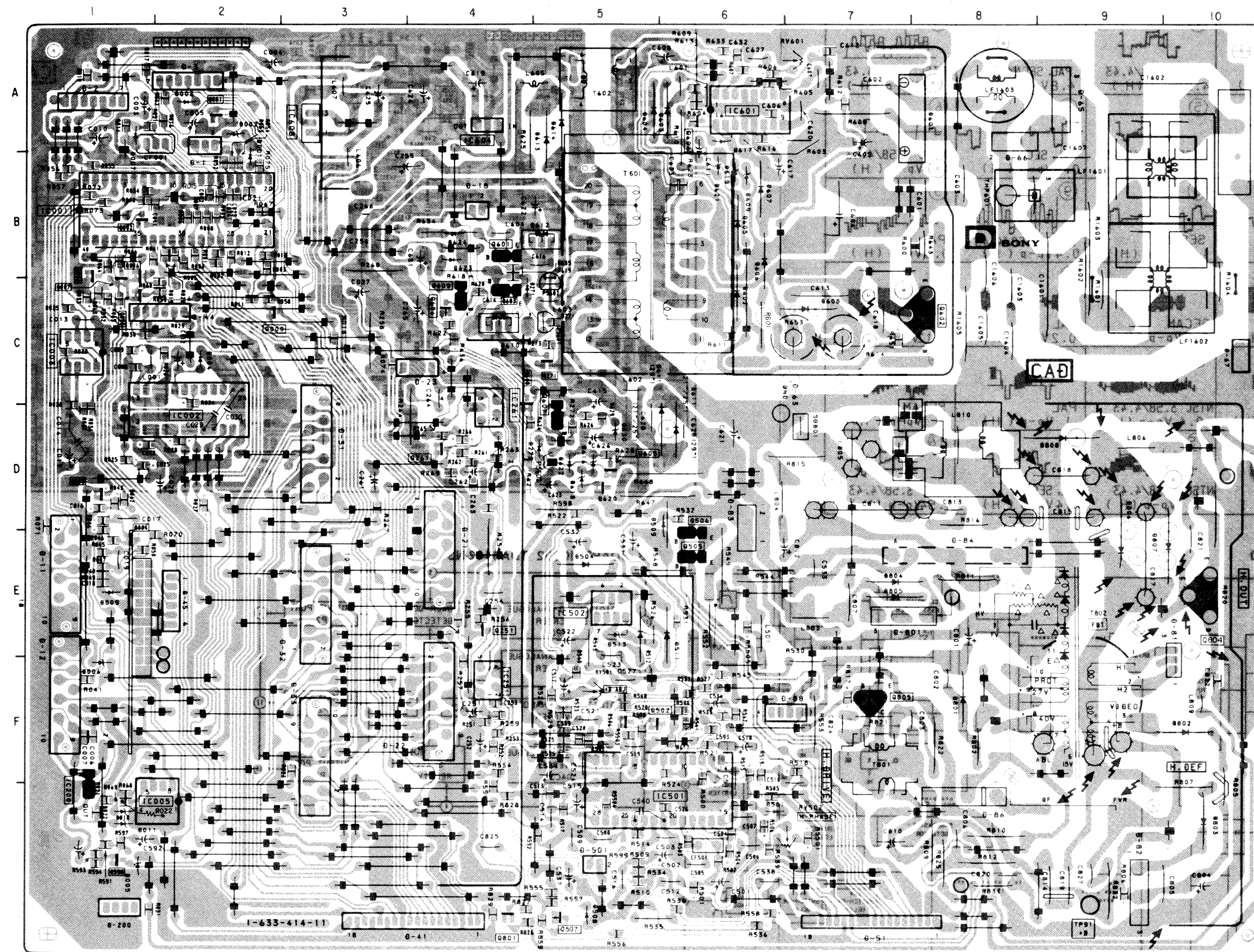


TUNING CONTROL,
POWER CONTROL,
AUDIO OUT, H/V OUT

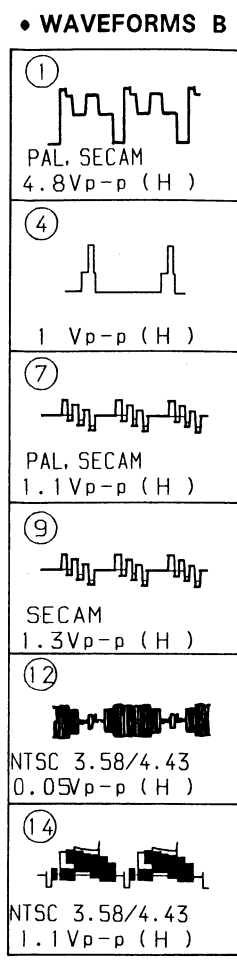
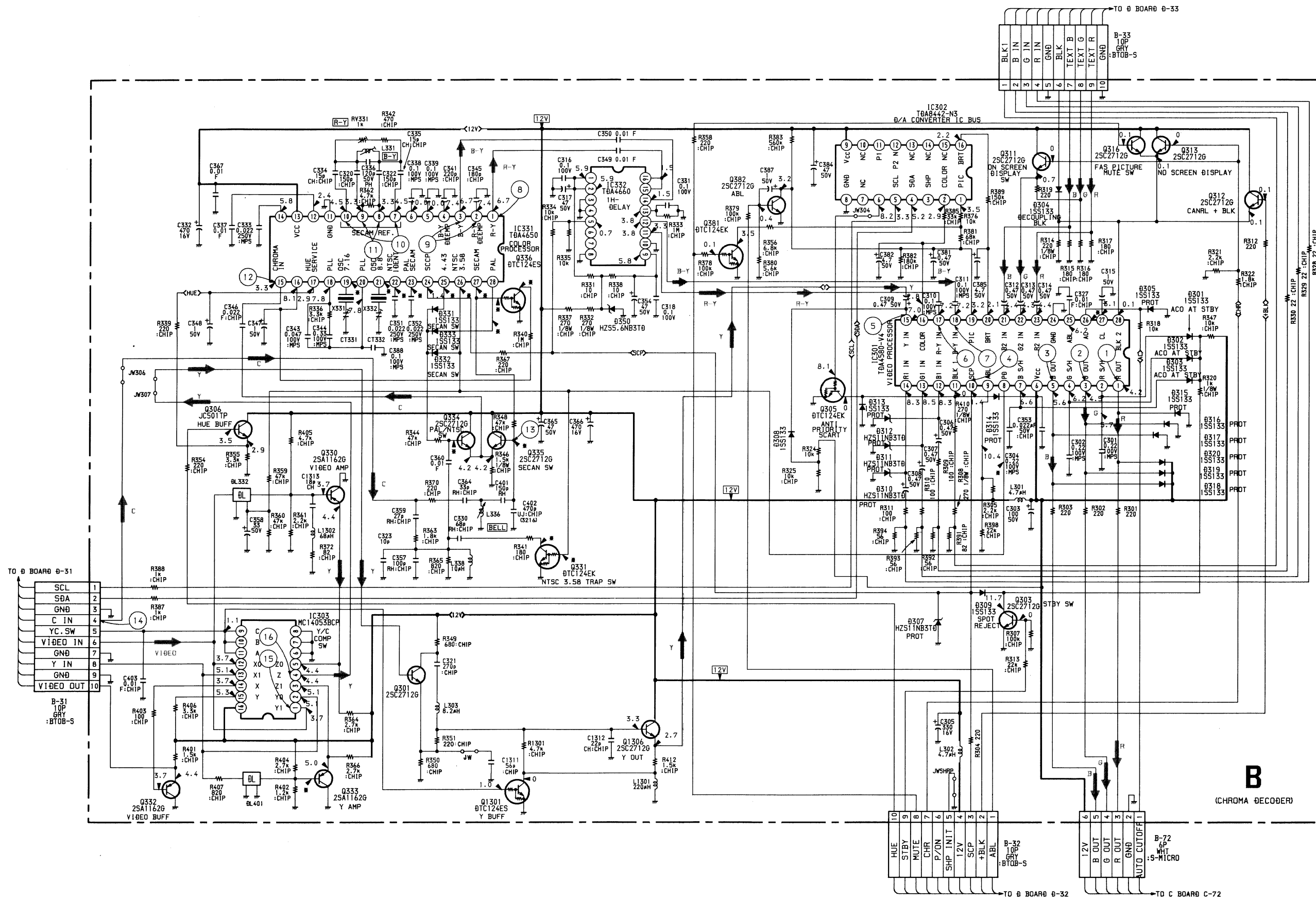
D

D

-D Board-

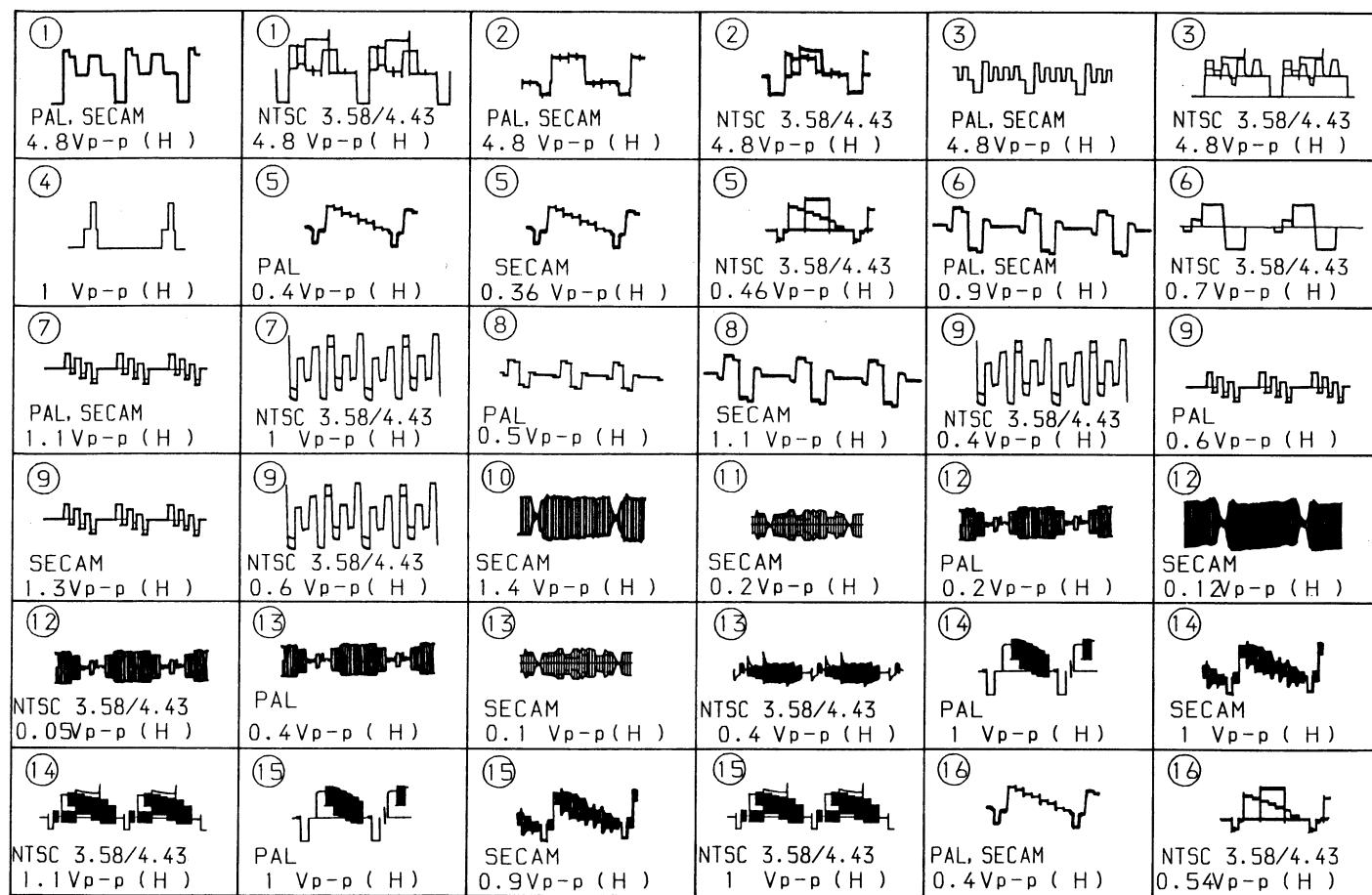


IC		D006	F-1
IC001	B-2	D007	A-1
IC002	D-2	D009	E-1
IC003	C-1	D010	G-1
IC005	G-2	D011	G-1
IC251	F-4	D271	C-4
IC261	C-4	D272	D-5
IC501	G-6	D501	G-6
IC502	E-5	D504	E-5
IC601	A-6	D506	F-5
IC604	A-4	D508	G-5
IC608	A-3	D509	D-6
TRANSISTOR		D511	E-6
		D512	E-5
DIODE		D513	E-5
		D601	A-8
Q001	A-2	D602	C-6
Q002	B-1	D603	A-6
Q003	D-1	D604	A-5
Q004	D-1	D605	B-6
Q005	C-1	D606	B-6
Q006	B-1	D607	B-6
Q007	C-1	D608	C-7
Q008	C-1	D609	B-6
Q009	C-2	D610	C-4
Q251	E-4	D611	D-6
Q261	D-4	D612	B-5
Q271	C-5	D613	A-5
Q502	F-6	D614	A-5
Q505	E-6	D616	D-5
Q506	E-6	D617	A-6
Q507	G-5	D618	D-5
Q598	G-1	D619	B-6
Q601	B-4	D620	D-5
Q602	C-8	D621	B-6
Q603	C-4	D622	D-5
Q604	A-6	D623	B-4
Q605	D-5	D624	B-4
Q606	C-4	D630	D-5
Q607	D-5	D801	F-8
Q608	C-4	D802	F-10
Q609	C-4	D803	G-10
Q801	G-4	D804	E-7
Q804	E-10	D805	E-7
Q805	F-7	D806	E-9
VARIABLE RESISTOR		D807	E-10
		D808	D-9
D001	B-2	RV501	F-5
D002	A-2	RV502	G-7
D003	A-2	RV601	A-7
D004	C-2		
D005	G-1		

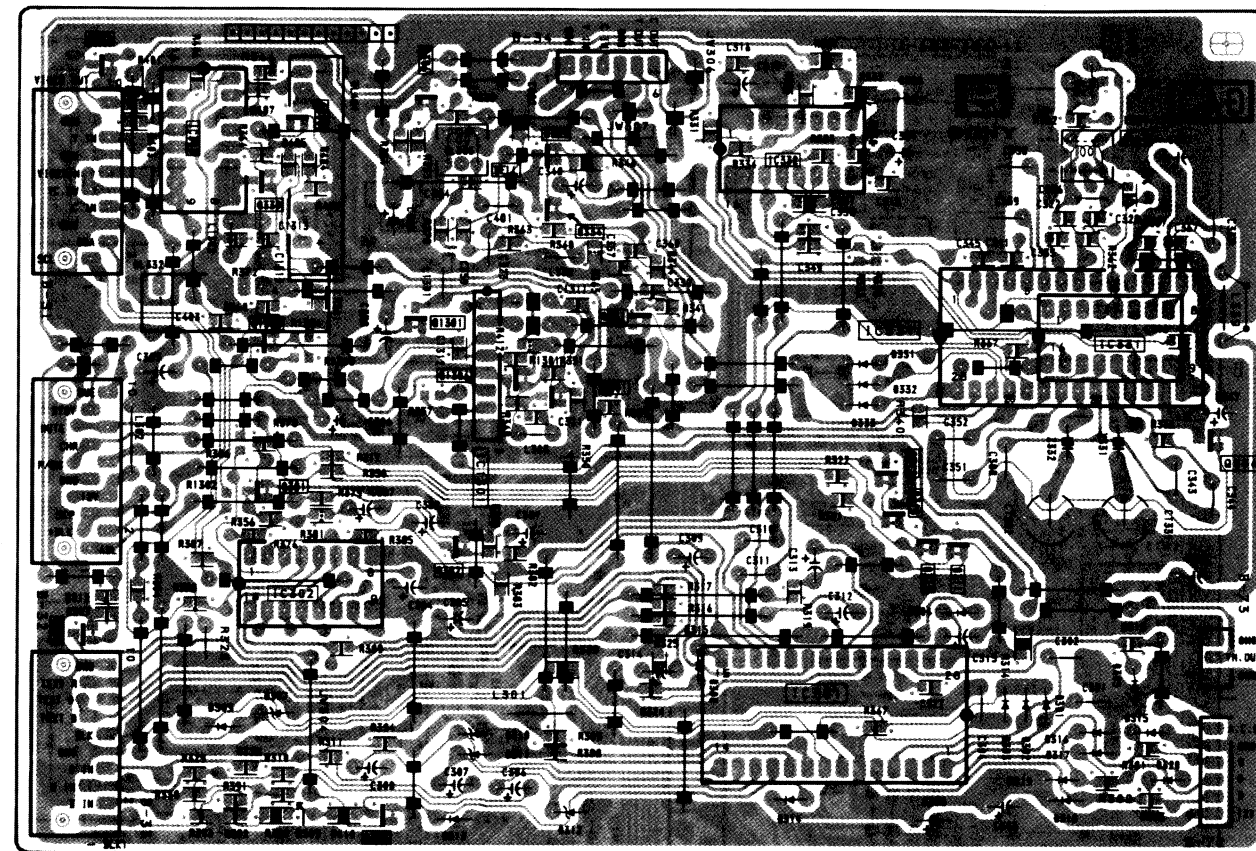


	PAL	SECAM	NTSC3.58	NTSC4.43
IC301 (8)	0.1	0.1	5.8	0.1
IC331 (19)	6.7	6.8	5.1	5.1
(21)	3.1	3.6	3.1	2.8
(22)	3.0	3.5	2.9	2.7
(23)	5.6	5.6	7.1	7.2
(24)	7.5	7.0	5.6	5.6
(25)	0.1	0.1	0.1	5.8
(26)	0.1	0.1	5.8	0.1
(27)	0.1	5.8	0.1	0.1
(28)	5.9	0.1	0.1	0.1
Q331 (B)	0.1	0.1	5.8	0.1
(C)	1.5	1.9	0	0.8
Q333 (B)	3.4	4.4	4.4	4.4
Q334 (B)	4.9	0.1	4.8	4.8
Q335 (B)	0.1	4.8	0.1	0.1
Q336 (B)	0.1	5.8	0.1	0.1
(C)	7.3	0	7.3	7.3

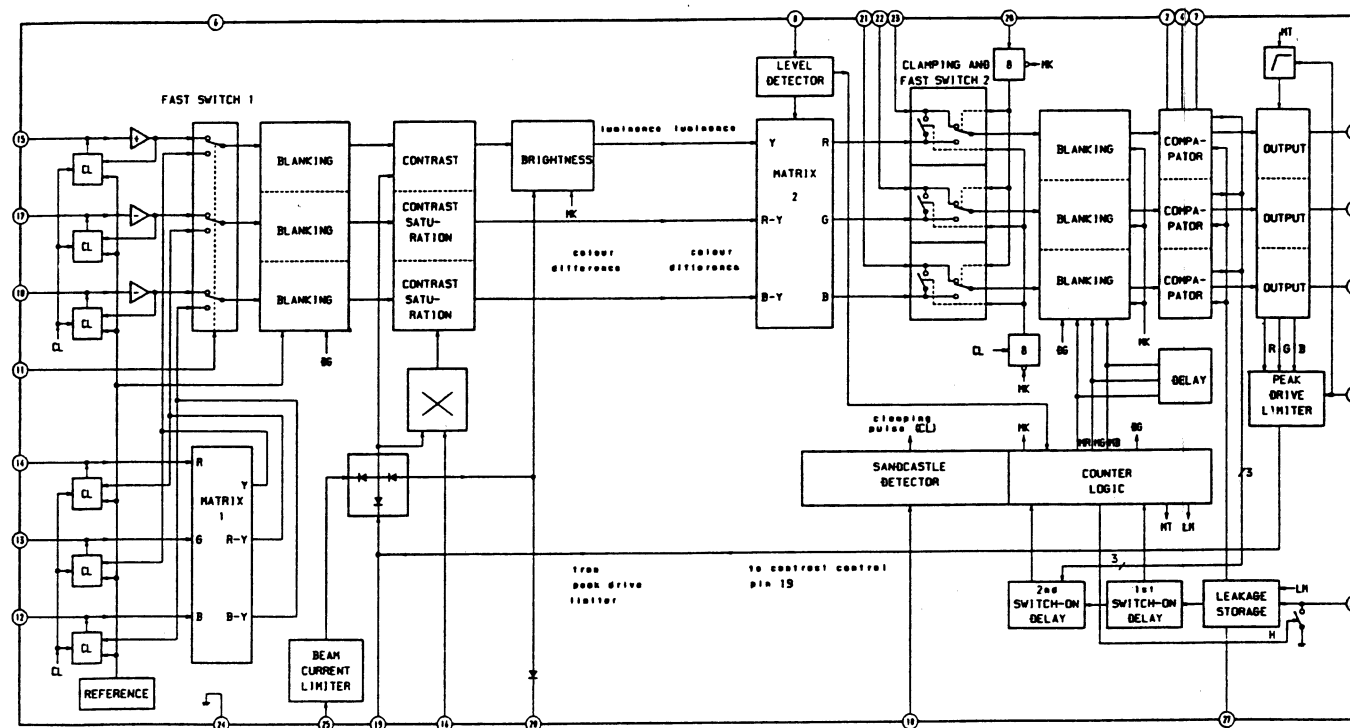
• WAVEFORMS B BOARD



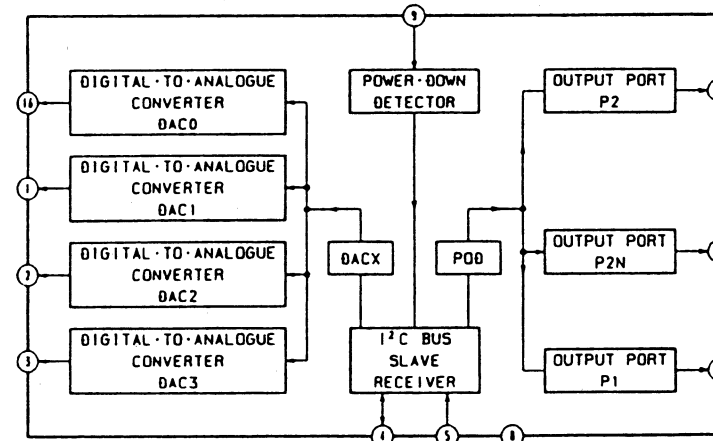
-B Board-



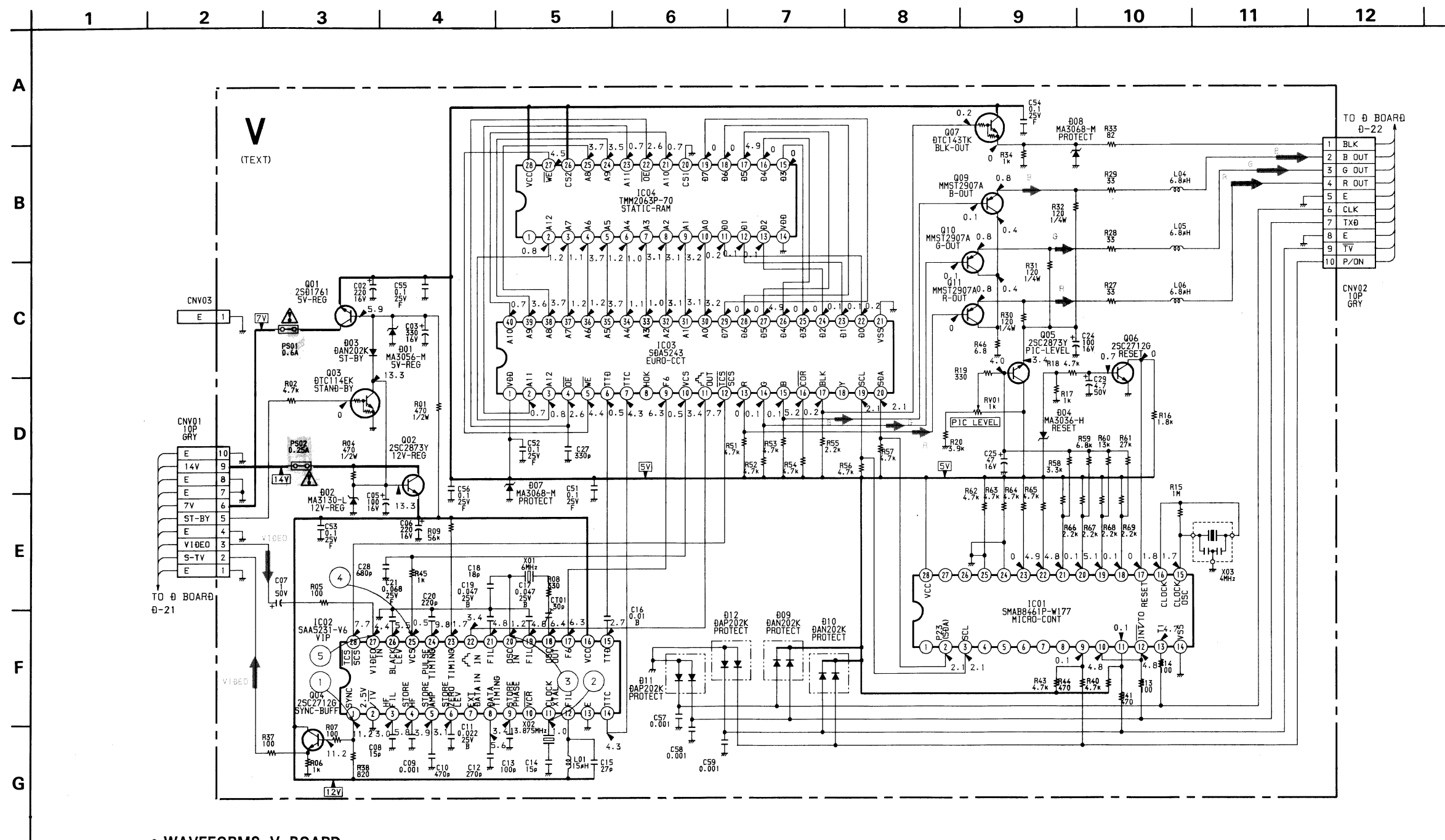
B BOARD IC301 TDA4580

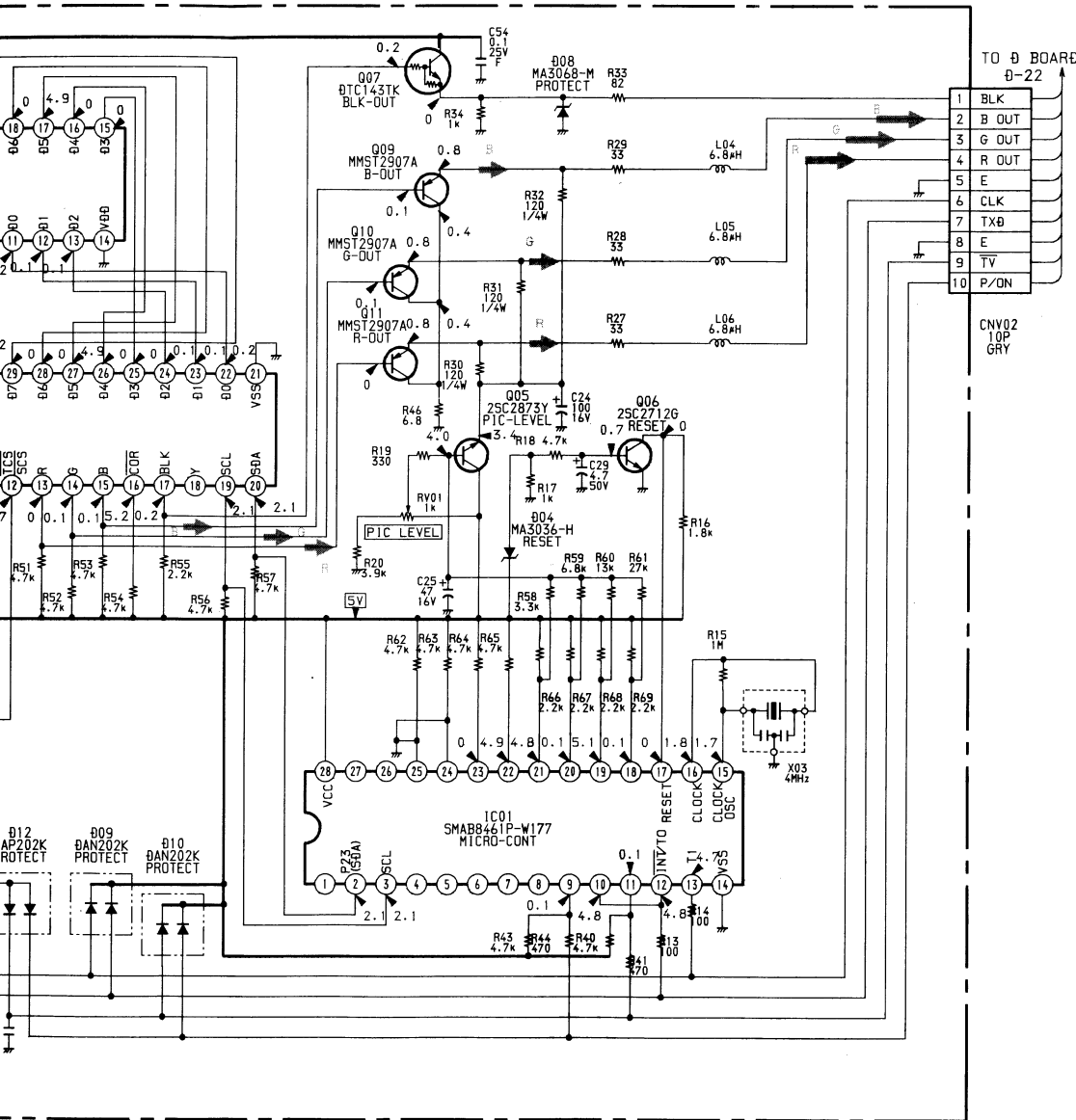


B BOARD IC302 TDA8442-N3

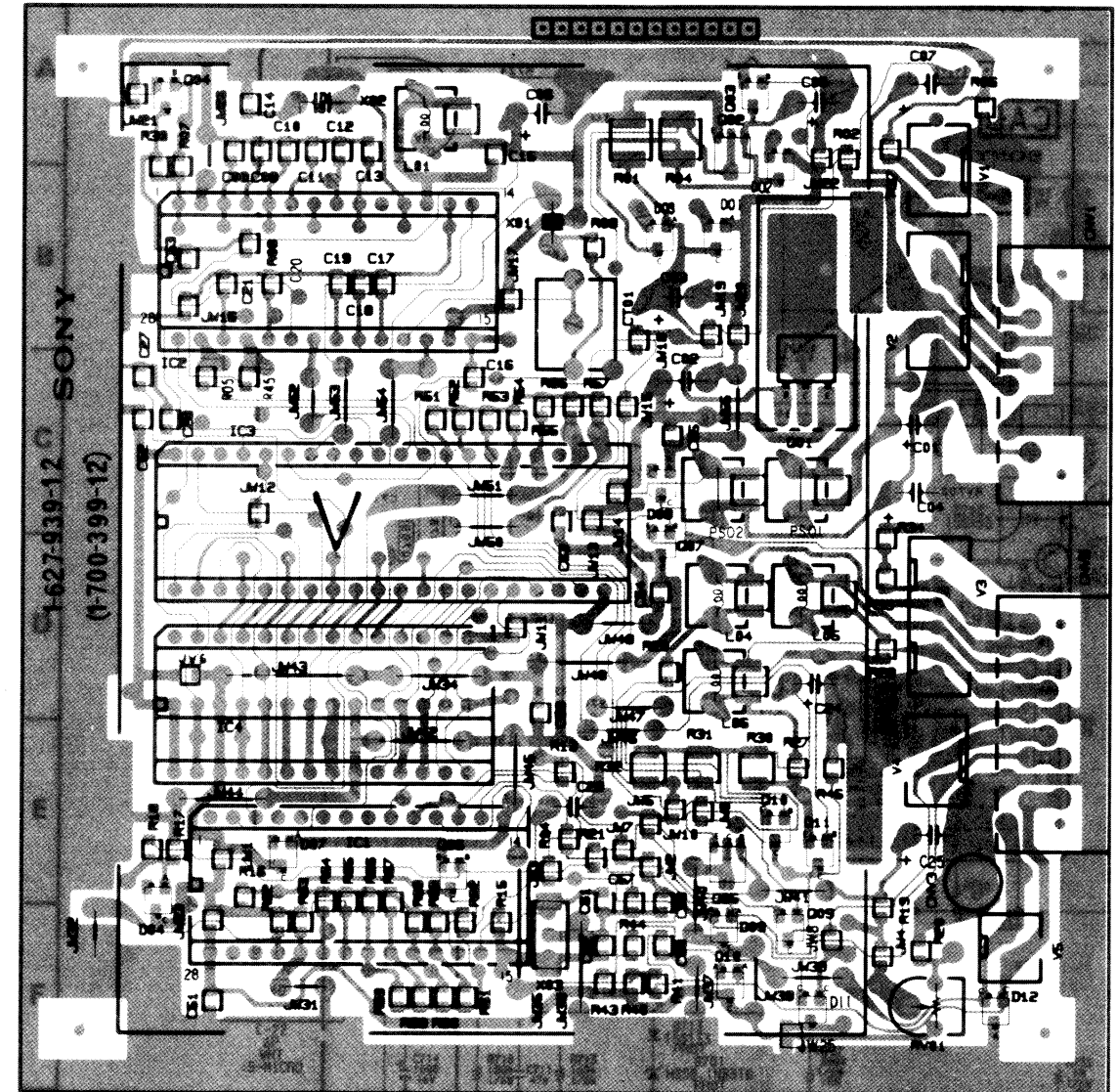


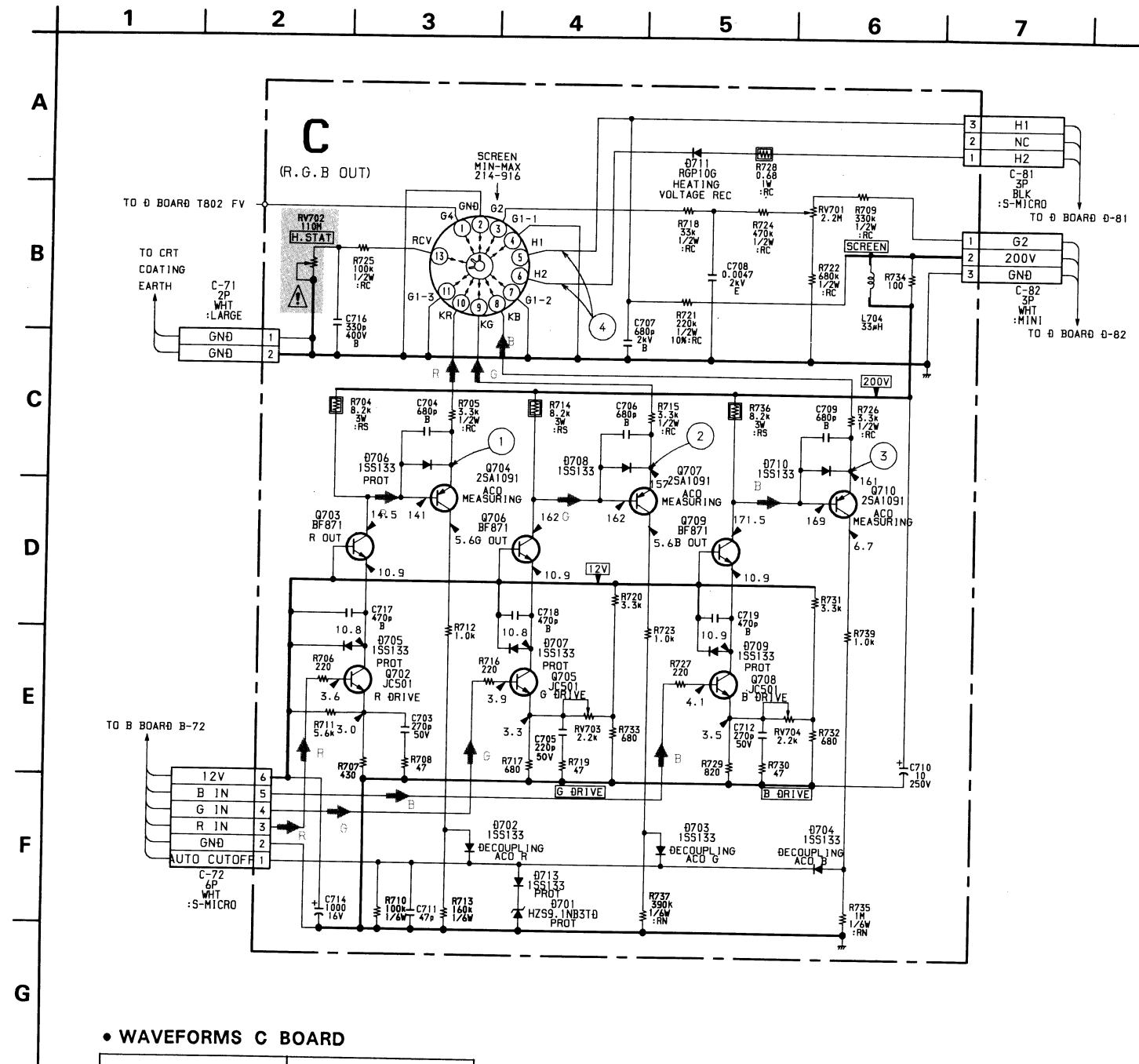
	PAL	SECAM	NTSC3.58	NTSC4.43
01 (B)	0.1	0.1	5.8	0.1
26 (B)	6.7	6.8	5.1	5.1
31 (B)	3.1	3.6	3.1	2.8
21 (B)	3.0	3.5	2.9	2.7
22 (B)	5.6	5.6	7.1	7.2
23 (B)	7.5	7.0	5.6	5.6
25 (B)	0.1	0.1	0.1	5.8
26 (B)	0.1	0.1	5.8	0.1
27 (B)	0.1	5.8	0.1	0.1
28 (B)	5.9	0.1	0.1	0.1
31 (B)	0.1	0.1	5.8	0.1
(C)	1.5	1.9	0	0.8
33 (B)	3.4	4.4	4.4	4.4
34 (B)	4.9	0.1	4.8	4.8
35 (B)	0.1	4.8	0.1	0.1
36 (B)	0.1	5.8	0.1	0.1
(C)	7.3	0	7.3	7.3



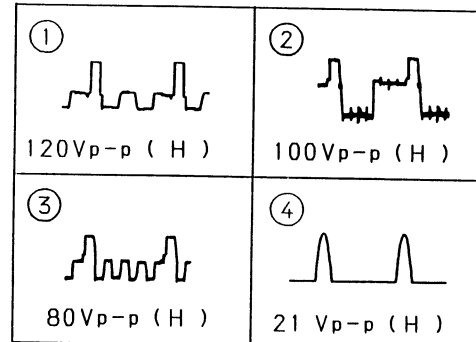


—V Board—

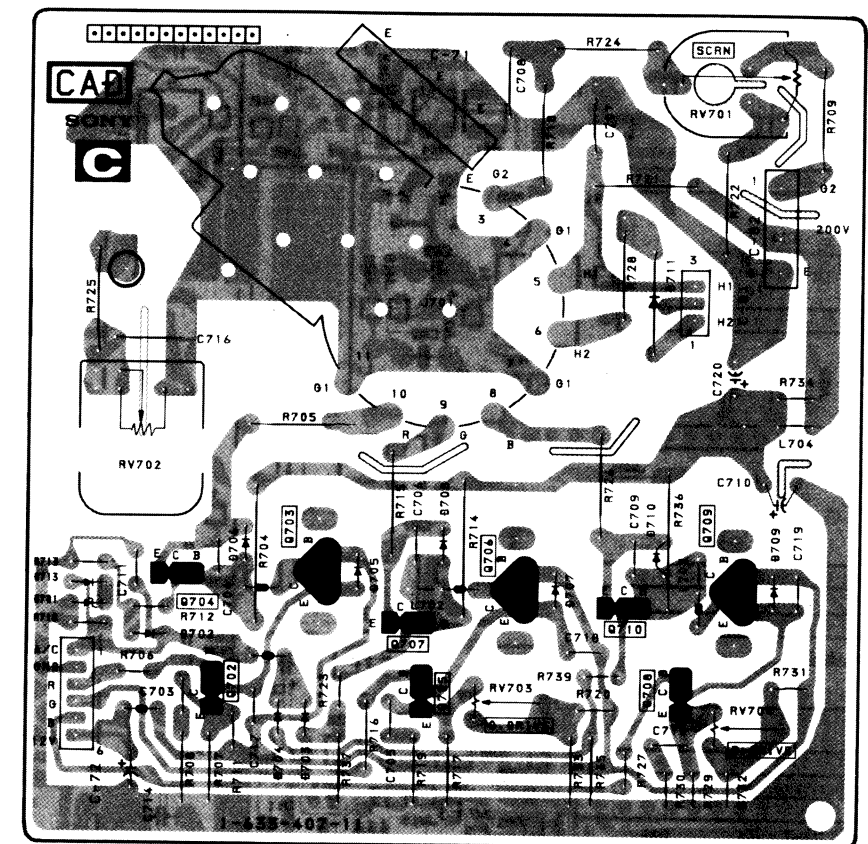




• WAVEFORMS C BOARD

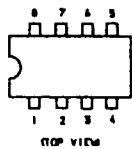


— C Board —



5-4. SEMICONDUCTORS

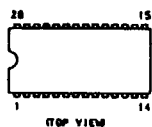
BA4558
SDA2546
TBA129
TEA2014
TEA2031A
μPC4558C



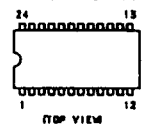
BX1387



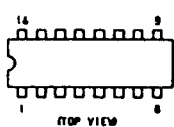
CXA1114P
SAA5231-V6
SMAB8461P-W177
TC5563APL
TDA4580
TDA4650
TDA6200
TEA2028B
TMM2063P-70



CXD1050A
TD6710AN



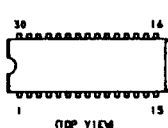
MC14053BCP
PCF8574
TC4049BP
TC4053BP
TDA4510/V6
TDA4660
TDA8442-N3
TEA2260



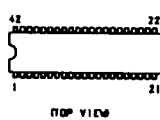
SDA2083
SDA5243



TA8662N



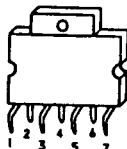
TC6011N



TDA2050



TDA8170



TYA7812CT
μPC24M05HF



BF871



DTA144EK
DTC114EK
DTC124EK
DTC143TK
DTC144EK
MMST2907A
2SA1162G
2SC2712



DTA144ES
DTC124ES
DTC144ES
2SA1162



JA101
JC501
2SA1091
2SD789



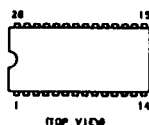
2SB734
2SD773
2SD774



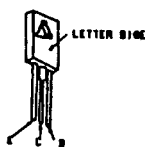
2SB1185
2SD1761



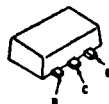
2SC2216



2SC2688



2SC2873Y



2SD1548-LB
2SD1941



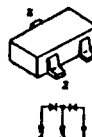
2SD2096



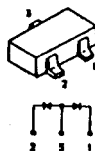
CTU-12S



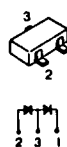
DAN202K



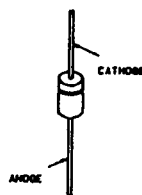
DAP202K



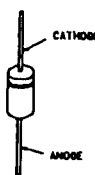
DA204K



ERC06-15S
ERC25-06S



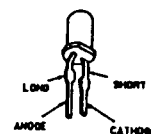
ERD28-08S
ES1F
GP08D
RGP10G
RGP15J



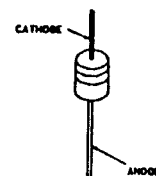
ERD29-08J



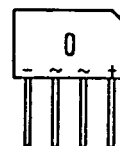
LD-201VR



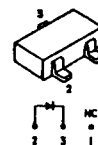
HZS10NB3TD
HZS11NB3TD
HZS13NB2TD
HZS15NB1TD
HZS33NB1TD
HZS36NB4TD
HZS4.7NB2TD
HZS5.6NB2TD
HZS5.6NB3TD
HZS6.2NB2TD
HZS6.8NB3TD
HZS7.5NB3TD
HZS9.1NB3TD
RD5.6ES-B2
1SS133



KBU4JL-6088



MA3036H
MA3056M
MA3068M
MA3130L



MC911



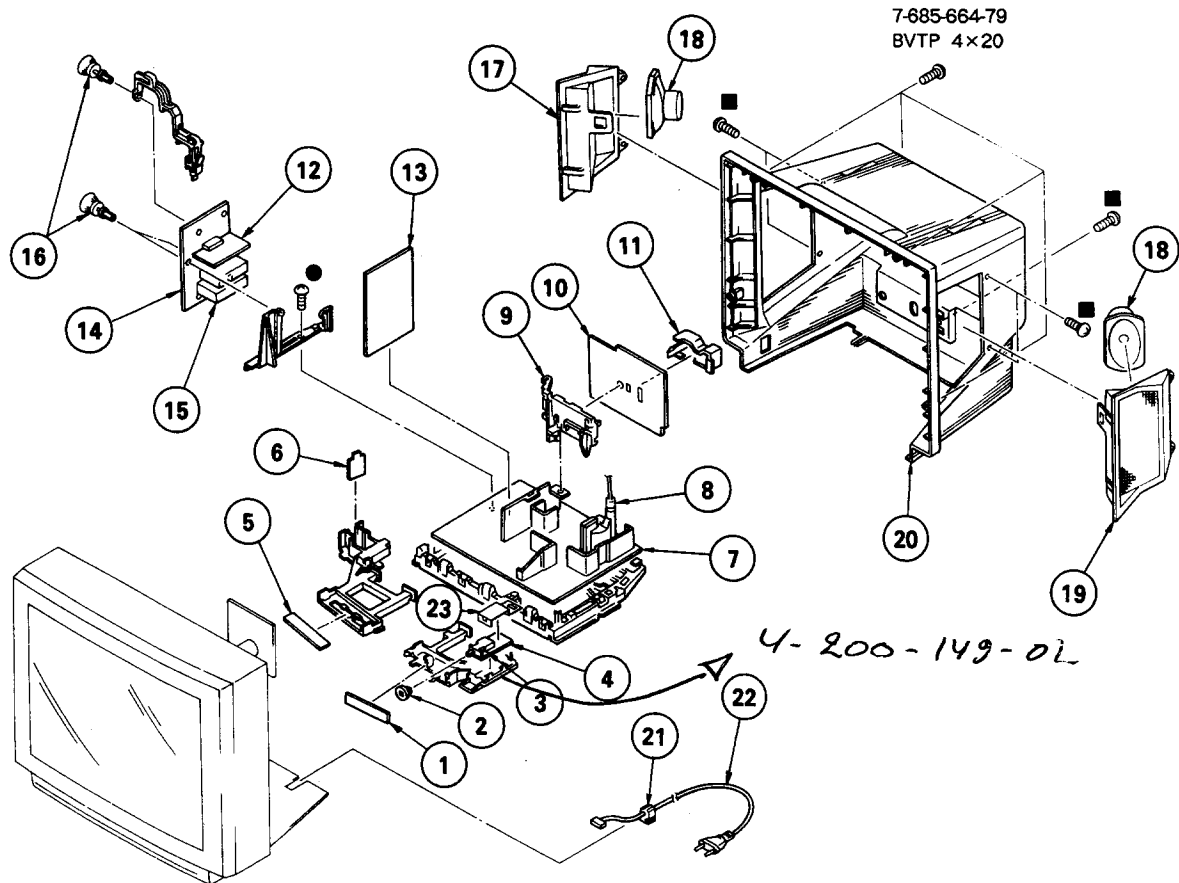
MC921



6-1. CHASSIS

● : BVTP 3×12 7-685-648-79

■ : BVTP 4×16 7-685-663-79



6-2. PICTURE TUBE

